

ADENOIDS

— AND —

KINDRED PERILS OF SCHOOL LIFE

D. T. ATKINSON, M.D.



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AND KINDRED PERILS OF
SCHOOL LIFE

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BY

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TO
AMERICAN SCHOOL CHILDREN

THIS LITTLE VOLUME IS AFFECTIONATELY DEDICATED
BY THE AUTHOR

PREFACE

A large part of the subject matter contained in this little volume was first contributed as "papers" to magazines and lay journals throughout the country. The many letters of appreciation following their publication and the requests for advice upon questions discussed from both parents and teachers, have been responsible for the author's re-writing these papers and placing them with the publisher.

Efforts have been made to eliminate as many technical terms as possible, the simplest language available having been used. The book is presented with a hope that the teacher may find in it a solution of some of the everyday problems of the schoolroom; that it will prove an aid to the perplexed mother, and a benefit to many children.

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INTRODUCTION

In the light of our present knowledge regarding the needs of children at school, we almost shudder at the mistakes which were perpetrated upon them a few years ago. More often than otherwise they were housed in rooms improperly heated and as badly ventilated. No thought was given to the importance of providing sufficient light from the proper source, and desks were not correctly arranged to accommodate the size of the child, this oversight causing humping shoulders, contracted chests and strained eyes.

Hygienic measures for mutual protection had not been dreamed of. Diseased children, who should have been isolated, became seat-mates of healthy ones. The old fashioned slate cloth laden with disease-producing or-

ganisms went the rounds and a drinking cup, reeking with germ life, was used by all alike.

In those "good old days" the dull, stupid child, instead of being considered sick mentally became the object of corporal punishment or occupied the dunce block, the butt of all the jokes of his fellow pupils. Children with lassitude and headache from eye strain and imperfect vision were often punished for backwardness. As a rule they were considered by their teachers as automatic little machines and were treated as such.

Gradually a change came about. Some thoughtful persons began to advocate that children at school had rights and should be protected from the many surrounding conditions which menace their physical welfare and retard their intellectual development. Reforms are made slowly. In this movement results, though delayed, came eventually, evidenced by the support of a large per cent. of people in the movement for better sanitary conditions in the schools, closer attention to

personal hygiene of the pupils and a broader understanding generally between pupil and teacher.

The public press has been responsible to a great extent for the sympathy this movement now possesses in the minds of the more intelligent people. A number of articles by physicians have appeared in the various journals of the country during late years which have had as their purpose the stimulation of the minds of the parents and teachers to the necessity of being on the alert for various defects in children which retard their progress physically and mentally.

That these have served their purpose is indicated by the fact that conditions which were a few years ago almost universally overlooked are now readily recognized.

The awakening of public sentiment through the press, has been responsible to a large degree for the establishment in most of our cities of medical inspection of schools. This was the first decisive step in the movement for the bet-

terment of prophylactic and hygienic conditions in the schoolroom. These first school inspectors were confronted with conditions which to us at present seem appalling. In some districts of New York twenty-five per cent. of the pupils were found to have trachoma, a disastrous and infectious eye disease. These were carefully excluded from the schools until they were cured. Children with tuberculosis in advanced stages were occupying desks and using the books and slate cloths of healthy children. The schoolrooms were found to be prolific sources of infectious skin diseases the spread of which no effort had been made to control.

The school inspector had an unpleasant duty to perform in setting right, to the best of his ability, the pernicious conditions which he found and this duty in the majority of cases he performed bravely, often in the face of condemnation of parents and severe criticism from the public generally.

In modern inspection the school children's

hearing is examined in a routine way. The little pupil who lacks interest in his studies and makes repeated mistakes, the child who is daily laughed at by his fellow pupils and, because of this chaffing becomes sullen and lacks confidence in himself, is often found upon examination of his hearing to be deaf. Is it any wonder then, that he appears dull of intellect and fails to keep up with other children of his age? Is it any wonder that the jokes at his expense drive him to attacks of despondent insubordination? A recognition of this child's defect changes things generally. He is sometimes benefited by medical treatment. If this is not possible the teacher should give him more individual attention or, as is the case in the larger cities, he should be put in a class of children equally unfortunate where special pains in distinct articulation are taken by the teacher.

Better ventilation, better lights, seats to accommodate the size of the pupils, with desks properly placed to prevent contraction of

chests and stooping of shoulders, have come with the advent of the school examiner, and under his régime dirty slate cloths have disappeared, as have the saliva-besmeared, second-hand books, the interchange of lunches and half-eaten fruits, and a campaign of education in behalf of hygiene, personal cleanliness and health has been originated.

The medical inspector filled an important place in a great movement, but in the larger cities it remained for that genius of sympathy, tenderness and thoughtful consideration—the graduate nurse—to establish conditions which are apparently as near perfect as they can be made. This great climax in a great work came only in 1907. The school nurse idea was originated by Miss Rodgers, a nurse in New York City. As an experiment she took the schools of a ward for six months. Her work there was so successful that a corps of assistants were employed within a year.

These nurses were specially selected. They were women with all nature's endowments of

higher and finer feminine feeling, broad-minded women who were familiar with social problems, their training specially fitting them with the sympathy and interest in child life necessary to make the movement a successful one. Their success may be estimated by the fact that nearly all large cities now employ a corps of school nurses. In Chicago alone there are nearly forty nurses in the schools, though the movement there is very young. Several small cities like Pueblo, Colo., Berkeley, Cal., and Galesburg, Ill., now employ nurses in the schools.

There are many points in favor of the school nurse system. For one thing the nurse in the schoolroom is on the alert for infectious conditions which may become epidemic. During the first year in New York one of Miss Rodger's assistants in a ward school discovered and immediately had isolated a case of scarlet fever. An epidemic with a probable necessity of closing the school was thus averted. Minor infectious conditions are isolated and

treated under the supervision of the medical inspector instead of sending the children home, as was formerly done, where they would be deprived of the advantages of the class room besides having their condition neglected until the following year, when they would be sent to school again only to have the exclusion process repeated. It was found that many children had been kept from school for years because of some simple skin disease or like condition which would have responded readily to treatment.

In many of these cases nurses have found it necessary to visit the homes of the children in order to instruct the parents and elicit their coöperation in preventing re-infection from the original sources. When a child has been sent home from school because of its having contracted some of the acute infectious diseases of childhood, such as scarlet fever, the nurse calls upon the family and instructs the mother not to allow his return until he has "peeled off."

Should he be sent back during this period the whole school is apt to be infected. The mother is taught that while one child has the mumps, for instance, the other children of the household should not go to school. Since the institution of the school nurse there has been a general reduction of school epidemics, and as the process of education goes on there is hope that they may be eliminated entirely.

Many children have been infected in schools with tuberculosis and specific diseases by using common drinking cups. Where the school nurse has gone the common drinking cup has been relegated and the individual cup system installed. The good that this movement alone has done can scarcely be estimated.

It is the nurses' duty to be on the alert for errors of refraction and eye strain in children, as well as for a multitude of eye disorders which retard the pupils' progress. Children with adenoids are taken to their parents and the importance of having the growths removed is impressed upon them. They are made to

understand the disastrous results upon the physical being and mentality of the child when the condition is not alleviated. In the majority of cases the parents are taught to understand the circumstances and in these cases neglect and procrastination is the exception rather than the rule.

CHAPTER I
ADENOIDS

ADENOIDS AND KINDRED PERILS

CHAPTER I

ADENOIDS

NOT many years ago after the first operation for appendicitis had been successfully performed, the press heralded to the world that a new disease and its cure had been discovered. A little later the public, after reading an account of an operation for adenoids upon the young king of Spain, asked if science was not about to burst the already swollen list of diseases by adding new ones. The sage who said, "There is nothing new under the sun," gave us an adage which is nowhere more applicable than in the field of pathology. Many diseases, so new a few years ago, are now known by the medical pro-

fession and the public to be as old as humanity itself. Appendicitis has been laying its victims in the grave for thousands of years and adenoids have left their baneful symptoms among the people of every time and clime.

The term adenoids applies to an enlargement of the third tonsil which lies back of the soft palate just high enough to be hidden from view. The swelling of this tonsil closes the avenue through which normal nasal breathing is carried on with the result that mouth breathing is resorted to.

That mouth breathing caused by adenoids is not a recently acquired condition is proven by mention having been made of it in the literature of all countries. For centuries it has been noticed that mouth breathers have been below the standard in intelligence. More than two thousand years ago Hippocrates, the father of medicine, in a manuscript written for his followers said, "Open-mouthed youths are sluggards," and numerous writers in later ages have referred to this supposed habit as

a cause of mental inferiority. In remote periods of human history the defects of the mouth-breather have been cut in marble by the truthful hand of the sculptor, and several Roman and Greek statues, to be seen in the British Museum and elsewhere, give us unmistakable evidence of the existence of adenoids as far back as Roman and Greek art goes. Many instances of mouth breathing are shown in later art.

The famous English throat surgeon, Gary Simpson, calls attention to the numerous likenesses of the great sculptor, Canova, of the early part of the last century, which represents him with open mouth and dull stolid look, and he produces evidence that he was deaf and melancholy.

It is a matter of wonder to many that the cause of this condition could have so long escaped notice, but a brief sketch of the history of medicine and surgery will call to our attention the fact that nearly all of its important discoveries and achievements have been made

within the last century. Few persons are aware how little was known of anatomy and medicine prior to that time. As an illustration, the brain is not mentioned in any ancient literature. The heart was thought to be the seat of affection and the warm "spirits of air" were sent to the various parts of the body through the arteries, hence their name which means "carriers of air." This mistake was believed sufficiently late to be incorporated into the English language, and as a result we have the phrases, "whole-hearted," "sick at heart," etc.

In Shakespeare's time, the nerves were thought to be tendons which gave strength to the body. Dr. Crooke, anatomist and physiologist, physician to his majesty, James I, gave the world the following bit of wisdom: "The immediate substance of the haire is a sooty, thicke and earthy vapour, which in the time of the third concoction is elevated by the strengthe and action of the naturall heate."

Lord Bacon held that the heart was not dis-

tended by blood, but by contained spirits which caused it to beat.

The humane treatment of the insane is of most recent origin. Not many years ago the insane were considered to be loathsome and repulsive creatures, whose bodies had been taken possession of by unclean spirits following some sin of their own or their ancestors, and the only hope of relief lay in flogging the poor victim with the idea of making his person such an uncomfortable abode for the visitor that it would retire.

It is recorded in England that Sir Thomas More, one of the greatest humanitarians of his age, often ordered the public flogging of lunatics, and we can not forget that, even on this side of the Atlantic, burning of witches was practiced in extreme cases when the demons refused to vacate the bodies of demented persons.

The first operation, under a general anæsthetic, was performed a little over sixty years ago, in the dome of the Massachusetts

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General Hospital, which institution is still in use. Previous to that time the patient to be operated upon was securely bound to the table and the operation proceeded with little attention to his groans and screams.

The "germ theory" is almost of yesterday, and the surgeon now performs, with all safety, operations which without the knowledge of germ life would mean certain death to his subject.

The microscope has opened up a new knowledge of the minuter structures of the body and has shown the "healthy pus" of the older surgeons to be a most potent destroyer of life. Animal serums have taken the place of the expectant treatment of former days, reducing the mortality in some diseases and almost abolishing it in others.

In this age medicine and surgery rest upon a sound and scientific basis. Surgical operations are robbed of their horrors and are performed with the subject in dreamless sleep. The parched and burning thirst of the patient

delirious with fever may now be moistened without fear of producing immediate death. The inhumane treatment of the insane is but a horrible memory and a foolish old woman or a hysterical girl no longer is burned as a witch. Not the least among the many victories that have been won for science is the discovery that the unfortunate and distressing symptoms attending adenoid growths may be relieved by one of the simplest, safest and most efficient of all surgical operations.

Though the mental inferiority of mouth-breathers has been recognized for ages, we have known only since 1868 that breathing through the mouth is not due to habit, but is the direct result of disease. The honor of having discovered the true cause of this condition, and devising a means of relieving it, is due to a Danish physician by the name of Meyer. He noticed that children who breathed through their mouths by day snored at night. After studying a number of these children, he found that they were dull, took poorly to their

books and did not have an average interest in the childish sports of their playmates. He observed that they had a thick nasal speech, frequently had discharging ears and deafness and were often melancholy and stupid. In his writings of this time he described them as being listless, backward and inferior.

After months of patient study, this acute observer found that the cause of the mouth breathing was a spongy growth in the back part of the nose which he termed adenoids. With rude instruments of his own construction he operated upon and relieved a number of his worst cases. Soon afterwards he reported his results to a society of surgeons in Copenhagen. His fame spread rapidly and in a few years his operation was being practiced to some extent at least in every civilized country of the world.

The adenoid operation, though performed by a limited number of surgeons in different parts of the world, did not come into general use until a few years ago. A campaign of

education has been going on in recent years and parents as well as physicians are more on the alert now than formerly for the detection of conditions which interfere with the physical welfare of children and retard their mental development. Both parents and physicians recognize now that mouth breathing is a condition resulting from disease, that it is not a habit and that a child in a normal condition will not breathe through its mouth. They recognize now as they never did before, the cause of mouth breathing in children. That cause is adenoids.

During late years the treatment of all the ills resulting from mouth breathing in the young, or at least of those who fall into the hands of intelligent physicians, has been revolutionized. The competent physician no longer wastes time in trying to subdue the symptoms peculiar to mouth-breathing children by internal medication, but strikes at the root of the trouble and brings to the little sufferers speedy relief by removing the cause.

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Despite the fact, however, that the medical profession and a large per cent. of the public realize that with this condition are associated complications which are grave and disastrous, and which are a constant menace to the health and welfare of the child, one is confronted almost daily by children whose development, both mental and physical, is being arrested by this abnormality.

CHAPTER II

WHAT ARE ADENOIDS?

CHAPTER II

WHAT ARE ADENOIDS?

AS already mentioned, adenoid growths consist of an enlargement of "Luschka's tonsil," a structure lying behind the nose. The common idea that tonsils exist only on each side of the throat is not a correct one for they are found in the larynx, on the base of the tongue and on the wall behind the nose, as well as in the sides of the throat. To those who accept the theory that man originated from lower forms of life, these tonsils are thought of as rudimentary useless organs. To others they are still a subject for controversy. All agree, however, that when engorged they become a source of great annoyance and discomfort to their unfortunate possessors and that when their enlargement be-

comes marked, they give rise to numerous baneful symptoms.

In order that we may trace these symptoms to their cause and obtain an understanding of the havoc wrought by diseased tonsil tissue generally, let us take a brief review of the anatomy of the tract through which normal breathing takes place.

When the mouth is opened and carefully inspected under a good light a large fleshy band will be seen stretching across its upper portion just back of the upper jaw. This is the *soft palate*. Attached to it and extending downward is a little flabby projection, the *uvula*. The palate and the uvula may be spoken of as the line of division between the throat behind and the mouth in front. Above the palate is the nasal chamber divided by a partition, the *nasal septum*, into two orifices or nostrils through which normal breathing takes place.

Back of the partition dividing the nostrils is what is generally spoken of as the *naso-*



CROSS SECTION OF HEAD

A represents a large mass of adenoid tissue attached to B the back wall of the naso pharynx.

pharynx. On the surface of the nasopharynx is placed the tonsil tissue which when enlarged becomes adenoids. Extending into each nostril from the external side are three little shelves, the *turbinals*, which serve a triple purpose. They increase the area for the distribution of the olfactory or smelling nerves, give a larger surface for the nasal mucous membrane which produces the necessary moisture to be taken up by the inspired air, and also provide a larger surface for the radiation of heat, thereby attending to the proper warming of the air before it passes into the lungs. The air instead of passing straight through the nose as it would if it were not for these little curved shelves of bone, is directed from side to side and deflected upward and downward, thus being brought in contact with a larger surface of mucous membrane, receiving more heat and moisture therefrom.

It has been found that when these shelves are destroyed by disease the sense of smell is either diminished or entirely lost, and the pro-

duction of mucus is also greatly interfered with. A dry irritated condition of the throat results from the absence of this mucus.

On examining the nostrils of children suffering from adenoids, the turbinals or shelves are almost invariably found to be enlarged, sometimes to such an extent that complete occlusion of the nostrils occurs. The younger the child, the less marked is this obstruction. In older children this deformity is sometimes permanent and the removal of the adenoids fails to bring any relief whatever, a potent reason for an early operation in all pronounced cases.

Directly above the nose are to be found a number of little avenues extending into recesses in the bony structure of the head. These are the accessory nasal sinuses. They are generally thought to be functionless, though a number of uses have been accorded them such as their ability to modify the resonance of the voice, being warming chambers for inspired air, etc. They are at times, how-

ever, a source of great inconvenience and discomfort, for the ordinary "cold in the head" is usually complicated with an involvement of these sinuses, and repeated "colds" often leave them chronically diseased. Adenoids, by disturbing the normal drainage of mucus from these cavities, often give rise to their continuous congestion, and much of the dull headache and stupor to be found in adenoid children may be traced to this cause.

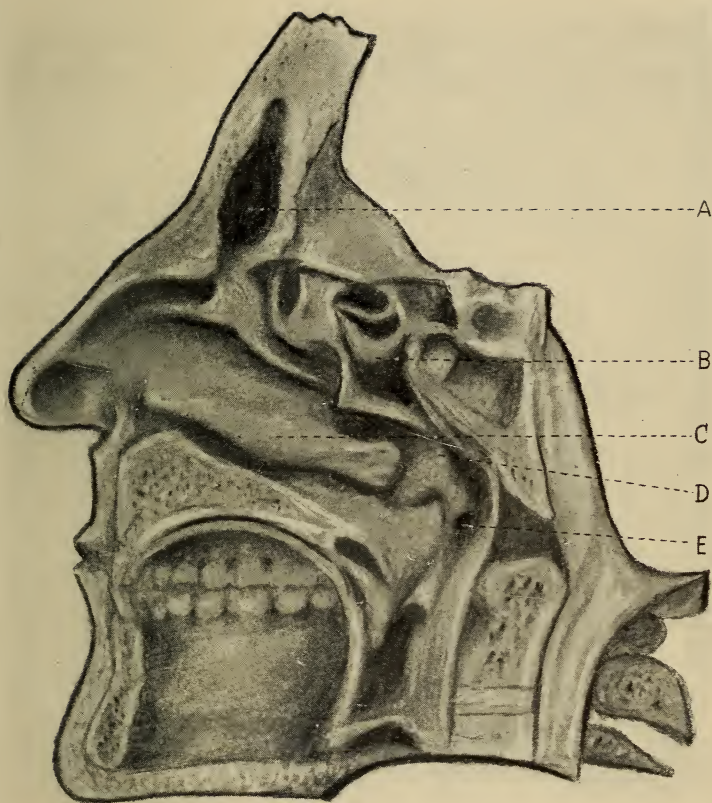
Anyone who has suffered with bad "colds" in the head, will recall that mental concentration of any kind was difficult or even impossible during such attacks. How then is a child who has perpetually clogged sinuses to make mental progress?

Continuing our exploration further we find on the side walls of the nose toward the back, two small orifices, the openings for the *Eustachian tubes*, little funnels which lead up into the middle ear and serve to drain and ventilate them. In the child with adenoids these tubes continually invite trouble to the

ears, for the swelling occasioned in the mucous membrane by the growths impinging on their orifices occludes them, so that neither ventilation nor drainage of the ear can be carried on in a normal manner.

On each side of the throat below the pharynx are to be seen two little bands, the *pillars*, which enclose the tonsils. In the normal throat, only a small portion of this tonsil can be seen as it lies deeply imbedded between these folds. In children a slight enlargement of the tonsil is so common as to appear to be physiologic, but often the enlargement becomes so pronounced that the tonsils lie almost entirely beyond the pillars, practically meeting in the middle line, thereby causing great obstruction to the breathing.

These pillars or bands sometimes stretch across the tonsils, completely "submerging" or covering them. When this occurs the bands form a receptacle for food, mucus and debris in general, and a chronic inflammation of the tonsil tissue ensues.



CROSS SECTION OF HEAD SHOWING THE NASAL
ACCESSORY SINUSES

A frontal sinus. B sphenoidal sinus. C turbinals. D naso-
pharyngeal wall. E opening of eustachian tube.

Behind and below the base of the tongue is the *tracheæ* or windpipe through which air passes to its branches, the *bronchi*, and thence to the lungs. Its upper portion is expanded to form the *larynx*, the sound-producing apparatus, in which are swung the vocal cords. The vocal cords are not cords, as their name would indicate, but are folds of elastic tissue covered with mucous membrane. They are attached in front and behind to cartilages, which are drawn apart by the attending muscles thus tightening the cords. The voice is produced by a vibration of these elastic bands. In the larynx, as elsewhere where tonsil tissue abounds, great disturbance to the voice results from its inflammation and enlargement. Associated with enlargements of the other groups of tonsil tissues, is often found involvement of this tonsil tissue in the larynx, probably occasioned by the irritation to the larynx from mouth-breathing.

The familiar Adam's apple is in the front part of the larynx. Above the larynx is sus-

pended the *epiglottis*, a little hood which closes and protects it during the act of swallowing, thus preventing the bolus of food from entering the windpipe. Immediately above the epiglottis is the base of the tongue, upon which are to be found numerous elevated nodules composed of tonsil tissue. Inflammation of these lingual or tongue tonsils is accompanied by a harassing cough and other distressing symptoms. When a stone is thrown into a placid stream the ripples will be seen to radiate into all directions and soon tiny waves are breaking upon the shore.

“Waves” of inflammation may be said to travel in the same manner over mucous membrane, giving rise to disturbances remote from the point where they first occurred. In this way disorders of the lingual tonsil may be conveyed to the larynx by an extension of the inflammation over the mucous membrane.

The mucous membrane of the nose and throat is a soft delicate structure thickly set

with minute blood vessels. It forms the lining, so to speak, of the air passages. When healthy this membrane is smooth and shiny and is of a light red color. In a normal condition its surface is bathed with a thin clear fluid, but when irritated by "cold," dust or noxious gases, this fluid is transformed into a thick, ropy and tenacious matter, and becomes a favorable medium for the growth of disease germs. The starting point of an enlargement of the pharyngeal tonsil or adenoids is often an infection of this mucus in the nose. An inflammatory swelling of sufficient intensity to interfere with the entrance of air through the nasal passage is brought about, causing the habit of mouth breathing to be formed. The inflammatory process in the nose gives origin to a similar one in the tonsil tissue directly behind it and the child becomes a victim of adenoids.

It will be seen, then, that adenoids or enlargement of the pharyngeal tonsil may be due

to unfavorable climatic conditions. This structure has the unhappy faculty of being interfered with by "colds" very much as other tonsil tissue has. In warm climates they are not frequently found. It has been noted that on the Island of Saporoa (one of the Moluccas), on the equator where the temperature never rises above 75° to 80° and where it is dry and mountainous, only five out of seven hundred and seventeen school children were found suffering and not one out of one hundred adults examined were affected. On the contrary, in Greenland only sixteen out of sixty Esquimau children between the ages of six and fourteen were found to be free from adenoids. (Simpson.) Sudden changes in temperature, badly ventilated schools and living rooms, exposure to wet and cold, and other conditions which produce inflammation of the mucous membrane of the respiratory tract are instrumental in causing the largest per cent. of adenoids. The imperfect use of the jaws from the prac-

tice of feeding children with the bottle and on semi-liquid foods, the habit of thumb sucking, or what is worse, the sucking of rubber nipples or "pacifiers" are, no doubt, predisposing causes in a certain per cent. of cases.

CHAPTER III

THE SYMPTOMS OF ADENOIDS

CHAPTER III

THE SYMPTOMS OF ADENOIDS

THE symptoms of adenoids are so well marked that they will not escape the notice of any but the most casual observer. The change in facial expression is usually very pronounced. The eyes are often set farther apart than in normal children and have a dull, listless appearance. The nostrils may be contracted. The mouth is held open, the second teeth may be irregular and the bearing of the child is one of stupidity and inferiority. There is, however, a small per cent. of adenoid children who do not present, to any marked degree, this characteristic dull appearance, yet some change in facial expression is nearly always present.

The inability to nurse sometimes seen in in-

fants is caused by a suffocation produced by adenoids. In pronounced cases there is a regurgitation of the milk through the nose. Regurgitation of liquids is sometimes seen in adults who have these post-nasal growths, especially when the condition is aggravated by swelling of the mass from "colds." This symptom is due to the adenoids mechanically obstructing the soft palate and keeping it from closely fitting to the back part of the throat and affording normal protection to the nasal chambers.

Children with adenoids very often make a peculiar noise while eating which has been aptly described by their mothers as "piggified." In the more fortunate class of adenoid children a shortening of the upper lip with some contraction of the nostrils is all that will be noticed. When the growths are large enough to prevent free movement of the soft palate during speech the voice lacks resonance and has a dead muffled sound. The child seems to be talking with something held in its mouth.

The nasal sounds are perverted. Words containing the letters *m* and *n* are pronounced with difficulty. "Common" sounds like "cobbod"; "nose" will become "doze" and "song," "sogg." The writer has detected the condition in children whose faces he had not seen by the nasal cry and by the peculiar characteristic perversion of the word "mamma."

Children with adenoids rest badly at night. They breathe through the mouth and snore heavily. Their physical discomfort causes their sleep to be disturbed by dreams and nightmares and it is not unusual for them to spend the night in tossing about in bed. They awaken in the morning unrested and remain tired and peevish during the day. At school they are backward, absent-minded and forgetful. There is often an inability to fix the attention, and as a rule they make poor grades in their classes.

Nearly every observant teacher can now pick out these children in the school room, guided only by their general appearance and

their lack of application. A cheerful disposition is often transformed into a melancholy one by adenoid growths, and the child previously bright and sunny becomes dull, stupid and morose. It is said by one authority that in seventy-five per cent. of the young men and women who prove a disappointment and incumbrance, rather than a help to their parents, the cause may be found in perverted mental development due to adenoids. Some time ago the writer had occasion to visit a school for the backward young in another state and was impressed by noticing that the majority of its pupils bore unmistakable evidence of having post-nasal obstructions, a fact anything but complimentary to the management of the school.

There is frequently to be found in these cases a hacking cough, which if not present during the day sets in shortly after the little patient has been put to bed. The function of the nose is to warm, filter and moisten the inspired air. When the child breathes through

its mouth the air enters the lungs unstrained and without being sufficiently moistened and warmed. The consequences are that it extracts the moisture from the throat and wind-pipe and keeps them dry and irritated. In many cases this accounts for the cough from which the little patient suffers.

Enlarged tonsils and adenoid growths are responsible for many cases of persistent cough in adults. Persons who breathe through their mouths carry into the larynx, twenty times or so a minute, a current of air which has not been freed from dust by the filtering process of the nose, and which is not moistened and warmed. The consequences are that the larynx is kept dry and irritated and responds rapidly to atmospheric changes. Some authorities on the throat have reached the conclusion that in mouth breathing cases there is kept up a mild, almost unnoticed chronic inflammation of the larynx which becomes aggravated under the influence of exposure to cold or irritation from

dust. In children with adenoids an almost constant "cold" in the head exists during the winter months. The inflammation of the mucous membrane associated with this condition often extends over the entire throat under the exciting influences occasioned by sudden changes of temperature, and a catarrhal condition of the larynx ensues. The mechanical irritation of the mucus from the nose trickling down the back wall of the throat and invading the larynx is often a factor also, in producing this character of cough.

The irritation from "cold" or inhaled dust may cause a thickening of the walls of the air cells so that proper oxygenation of the blood is not carried on. This lack of proper aëration of the blood gives origin to a number of reflex symptoms. Numerous writers mention hay fever, Saint Vitus' dance, bed wetting and other reflex disturbances as being associated with, and probably caused by adenoids. These growths are also thought to be a factor

in the production of convulsions in children, because of the improper oxygenation of the blood which they cause.

The crowded mouth, that is, the mouth in which the upper jaw is too small for the teeth to set without one overlapping another, or without the front teeth protruding, is almost always due to adenoids. The tongue while held in the normal position helps to form the arch of the palate during the process of the child's development. When the habit of mouth breathing is established the tongue falls down into the floor of the mouth, relieving the arch of the upper jaw of its normal support. The weight of the lower jaw while the mouth is open, gives rise to a constant pressure of the cheek muscles upon the outside of the upper jaw. It is nothing but natural then, that this arch, by being robbed of its support from within, which is the tongue, and by being pulled upon by the muscles from without, would not develop in proportion to the other parts of the jaw, and that this overlapping and

protrusion of the teeth would occur. This overlapping is due to the fact that the teeth are normal in size and the jaw is smaller than normal and therefore room is not afforded them without this overlapping process. Such a deformity leaves a very unsightly mouth and one which does not perform its physiological function.

The arch of the palate is formed by what is spoken of as the palate processes. When a contraction, or drawing in of the lower part of the jaw occurs, these palate processes act as fulcra, consequently the bony attachments above are spread apart. This spreading causes a coincident spreading of the bridge bones of the nose, which gives rise to the flattened appearance so characteristic of adenoids. The raising of the roof of the mouth and the drooping down of the nasal bridge will cause other structural changes in the nose, the most harmful of which is the twisting of the support of the nasal partition or septum with consequent closure of the nasal passage.



DEFORMITY OF THE CHEST OFTEN SEEN IN
CHILDREN WITH ADENOIDS

On examining the nostrils of those suffering from adenoids one generally finds a nasal catarrh more or less advanced. The younger the child the less is the condition marked as a rule. This is easily accounted for. The nose secretes several ounces of mucus every twenty-four hours, this being used in health in moistening inspired air. When normal nasal breathing is not carried on, a part of this unused secretion gravitates to the floor of the nose and decomposes. It is true that a portion escapes in front, giving rise to the familiar "running nose," but enough remains to produce an irritation which aggravates the discharge. This is the origin of the catarrh. There is no doubt that many children suffer in health by the infected mucus entering the stomach, destroying the digestion, and interfering with the appetite.

In adenoid cases a peculiar deformity of the chest may result. This deformity consists of an expansion of the upper part of the chest, a depression of its lower walls and a

sinking in of a part of the sternum or breast bone. The cause for this may readily be understood. Normal breathing is promoted by the descent of the diaphragm, a powerful muscle which divides the chest from the abdominal cavity. As this muscle descends the air rushes in to distend the lungs, the lungs themselves taking no active part in the breathing act. When the breathing is shallow, as it always is in cases of adenoids, the air does not sufficiently expand the lungs. The pressure of the air from without forces in the most yielding parts of the ribs, the costal cartilages, which are attached to the breast bone in front, and the depression ensues. As the sides of the chest come in closer and closer, the breast bone is forced forward by these cartilages. The lower cartilages, being the longer, cause the breast bone to be pushed out most below, and this point is made most prominent. This deformity, though often permanent, seems to be of little importance after its cause is removed.

One of the first symptoms to be noticed in adenoids is intermittent deafness. This dullness of hearing is noticed in the mild cases only when "colds" are present, but in pronounced cases it is more constant. A brief review of the anatomy of the ear will help us to better understand the reason for this impairment of the hearing.

For convenience of description the ear may be divided into three parts, the external ear which gathers air vibrations and carries them by means of the auditory canal to the drum membrane, the middle ear which transmits them across its cavity and the internal ear which receives them. The little bones of the ear, the mallet, anvil and stirrup, are stretched across the middle ear cavity from the drum membrane to the cochlea. Air vibrations falling upon the drum membrane set into motion this delicate little chain of bones, and through them these vibrations are transmitted across the middle ear cavity to the receptive apparatus in the internal ear and the impres-

sion is carried to the brain and there is registered as sound.

The middle ear is a closed cavity, except for a little tube which leads from the throat to it. This tube is for the purpose of ventilating the middle ear cavity. When this tube becomes closed by a plug of mucus being forced into it, or by its lumen being shut off by swelling, a rarefaction of the air in the middle ear is established because the fine blood vessels which line it take up the oxygen and exhaust the air. The semi-vacuum produced by this process causes a drawing in of the drum membrane, it being the point of least resistance, and a consequent crowding of the joints of these little bones with pressure upon the receptive apparatus and attending deafness.

It is easy to understand how an adenoid growth around the orifice of the Eustachian tube will interfere with the ventilation of the middle ear. The adenoids also harbor more or less mucus which clings to them and decomposes.

When the child with adenoids blows its nose, infected secretions are forced up into the ears where they set up an earache. The process of inflammation, which is occasioned by these secretions, fills the ear with serum. This serum may escape down the tube or it may burst through the drum membrane, causing the familiar running ear. The consequences are that the child is deaf. This accounts for his inattention. What other children in the room hear without difficulty, he fails to hear. In an effort to do his best he makes an answer—usually the wrong one, to his own chagrin and the amusement of the class. He is laughed at, becomes discouraged, sullen and apathetic and is often punished for a demeanor, which is only a natural one when its cause is ascertained. It is not to be wondered at that these little unfortunates lag behind and are known as stupid children.

Another prolific cause of deafness in children, and one closely associated with adenoids,

is diseased tonsils. It is rare to find chronically enlarged tonsils without adenoids being present. The tonsils may be only slightly enlarged or may be swollen so that they almost entirely fill the throat. In this latter condition their little "crypts," or cavities, are greatly distended and are filled with food and other débris. These deposits soon become putrid and a chronic inflammation or "cattarrh" of the throat ensues. It may be said in a general way that any condition of the nose or throat with which is associated a cattarrhal discharge, is a constant menace to the ears.

CHAPTER IV

WHEN IS OPERATION NEEDED

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WHEN IS OPERATION NEEDED

IN this day of over-enthusiastic surgery parents often hesitate to have their children operated upon even though they realize that they have adenoids. Nor are they to be condemned for this conservatism, for in mild cases good results may sometimes be obtained without surgical interference. It is well to remember that a certain amount of lymphoid or adenoid tissue in the nasopharynx is normal and its presence may do no harm. When there is only a slight enlargement of this structure, and when the symptoms are not severe, results may often be obtained by spraying the nose and throat with an alkaline solution. For this purpose nothing is more effective than a preparation found in all drug stores under the name of Doebell's Solution. It is

well to use the spray night and morning and to observe the precaution of keeping the child indoors for half an hour afterwards, for while this procedure cleanses the inflamed surfaces, it also robs the delicate membrane of its mucus which is nature's protection against cold and irritation from dust.

In addition to this the child should take breathing exercises night and morning under the supervision of some responsible person. The child is taught to breathe deeply through the nose with the mouth closed and to avoid mouth breathing as much as possible at other times.

The following deep breathing exercises are recommended by Dr. R. A. Lyster in the *British Medical Journal* of 1905:

"1. Extend the hands and stretch the arms forward at the shoulders leaving about a foot between the hands, which should be turned with the palms inwards and fingers stretched out straight. Slowly move the arms backwards as far as they will go (while deeply in-

spiring), and slowly bring them forwards until they are in the same position as at the starting (while deeply expiring). Repeat this from three to six times.

“2. Hold the hands downward with the palms against the legs. Raise them with palms inwards (inspiring) and when they are immediately above the head turn the palms outward and slowly bring them down to the sides (expiring). Repeat from three to six times.

“3. Hold the hands against the thorax, with the fingers pointing inwards and touching back to back. Then with a swift movement swing the arms out as far as they will go (while inspiring). Begin again (expiring) and repeat half a dozen times.

“4. Keep the arms down, the palms touching the sides, slowly turn the palms outward as far as they will go (inspiring), and slowly bring them back to the sides (expiring). This may be done six or eight times. This exercise apparently so simple, expands the

chest and presses together the shoulder blades."

The following extract from another work by the same author, gives other simple rules for deep breathing exercises:

"These exercises are of great value and should form part of the daily training of every scholar. It is of great importance that the correct method of nasal breathing should be taught from the beginning of school life."

"1. For infants, a simple imitative exercise is the most easily acquired. The infant, standing or sitting, and watching the teacher, places the left hand over the pit of the stomach and breathes in as she does, noticing the hand rise during the inhalation. The child then breathes out slowly, the hand at the same time sinking. On each occasion the teacher must watch the class carefully, and note that all the mouths are firmly closed, and that all breathing is through the nostrils only. This exercise should be repeated about six times at least twice daily."



TYPICAL FACIAL EXPRESSION RESULTING
FROM ADENOIDS

Following picture shows same child three months after operation.

“2. For older children: The teacher starting from the position of attention should see that all the mouths are firmly shut; then on the command ‘breathe in’ (slowly given) instruct the pupils to breathe in slowly and deeply though the nostrils only, until the chest is fully expanded, then on the command, ‘breathe out’ (slowly given) to breathe out quietly and steadily; this exercise should be repeated about ten times at least twice daily. When the exercise is repeated the commands ‘in’ and ‘out’ only should be used.”

Sleeping on the side instead of the back will greatly facilitate normal nasal breathing. When the tendency to mouth breathing is marked and persistent a strip of adhesive plaster placed across the closed lips may be of service. If, after weeks of careful observation and treatment there is no marked improvement, an operation for the removal of the growth should be performed.

The removal of adenoids is one of the simplest of surgical procedures and there is proba-

bly no operation which gives such flattering results. The change brought about in a very few months subsequent to the operation is often a matter of astonishment to the parents of the child. His gain in health and strength and his rapid strides in school is little short of marvelous. It may be safely said that all operations for adenoids in young children, if correctly done, are successful.

While some cases of post-nasal growths respond to medical treatment, the majority of them do not and we must be guided as to the necessity for operations by the severity and persistence of the symptoms.

Children who are incorrigible mouth-breathers, and who have a discharge from the nose, with attacks of intermittent deafness, never respond to treatment, and belong to the class in which surgical interference is imperative. Chronic adenoid cases with discharge from the middle ear which have resisted all treatment should be operated upon. In adenoid children who have developed mental dull-



FACIAL EXPRESSION OF CHILD THREE MONTHS
AFTER OPERATION FOR ADENOIDS

Preceding picture shows same child before operation

ness, attended with a general disturbance of health, and in cases where there is an obstinate cough, the operation is indicated.

Young adults in whom the adenoids have produced their pernicious influences to the ears, may often be greatly benefited by a removal of what remains of the growths, followed by a general treatment under the direction of the physician.

Young children who are backward in their speech, due to the adenoids interfering with the free movement of the soft palate, and those who have large faucial tonsils with adenoids, are greatly benefited by the operation.

Fifty per cent. of all adult cases of nasal and ear diseases owe their affliction to neglected adenoids during childhood, and nowhere is this lamentable fact more thoroughly recognized than in the office of the nose and throat specialist.

CHAPTER V

EAR DEFECTS

CHAPTER V

EAR DEFECTS

THERE is probably no condition which so retards the progress of a child at school as does defective hearing. This is not as uncommon in children as may be supposed, for when it exists it is often overlooked and the child's lack of progress and seeming stupidity is too often attributed to a lack of interest in school work or to stubbornness. This fact was very conclusively demonstrated a short time ago by a systematic examination of the hearing of pupils in a Massachusetts school for backward children, which proved that in three-fifths of the children, the hearing was defective.

The discovery that a child is deaf will at once account for his inattention. It is not to be wondered at that he lacks interest in the

studies which his normal companions enjoy, for what they hear perfectly he catches only with the greatest effort, if he does not misunderstand it entirely. It is quite obvious that such a defect will make a child appear to be dull and will lead eventually to an undeveloped intellect. The inattention which this disturbance gives rise to causes a lack of precision also. He misses the first part of the sentence addressed to him by his inattention, and in trying to catch it he loses the second part. In such cases there is usually some thickening of the drum membrane and stiffness of the joints of the little ear bones which transmit the sound waves. The sounds are mixed or confused because the membrane and ear bones are not quick to convey the vibration.

Nearly all cases of dullness of hearing in children are traceable to a catarrhal condition of the nose and throat. Here the proverbial ounce of prevention is worth a pound of cure. Good hearing is best promoted by keeping the

mucous membrane of these organs in a healthy condition. This is best done by a habitual exposure to pure air, thus preventing the "colds in the head" which are almost certain to be fostered by coddling and an indoor life.

The ear is an extremely delicate organ and should not be indiscriminately interfered with. It, more than any other organ, should escape the remedies from the family medicine chest. Beyond a gentle washing, it is dangerous to do anything to the internal part of the ear without the advice of a physician. The Germans have an adage, "Put nothing but your elbow in your ear," and if this maxim were adopted as a guide, much mischief could be prevented. Picking at the ear with hairpins and toothpicks often causes irritation which results disastrously to hearing.

Rupture of the drum membrane, followed by discharge, is a common cause of deafness in children. This rupture may follow an infection of the middle ear from some similar process in the nose or throat or may be sec-

ondary to the acute eruptive fevers, such as scarlet fever or measles. Rupture of the drum membrane followed by infection and a discharge from the ear is often caused by the time honored custom of boxing a child on the ear. In the light of our present knowledge regarding this organ, it is nothing short of criminal to resort to this method of punishment.

Discharges from the ear, besides frequently causing deafness, are dangerous to life because of the probability of brain involvement. This is now so generally recognized that no insurance company will accept as a risk an applicant with a chronic ear discharge. Such cases should be under the care of the medical man until cured. If they are allowed to run nature's course, they may become complicated by an involvement of the mastoid cells, a condition which is a constant menace to life.

The hearing is often found to be impaired by a collection of cerumen or wax in the external canal. Attempts at the removal of

this wax should never be made by the unskilled and the child should be referred to the physician for attention. Eczema of the external canal may often lead to an accumulation of débris which interferes with the hearing, though the deafness soon disappears when the cause is removed.

All cases of deafness in the schools should be observed by the teachers and should be referred to the parents for appropriate treatment. Until the child is relieved the larger part of the efforts spent in his education will be wasted and later he will face the world with a serious handicap. It is the teacher's duty to impress upon the parents the importance of righting this wrong. This may have to be done in the face of a great deal of prejudice, though procrastination and neglect by parents is the exception rather than the rule when they are taught to appreciate the situation in its true light.

Statistics have been gathered which go to prove that fifteen per cent. of all school chil-

dren have defective hearing. It is impossible to make a correct conclusion regarding a child's inattention or backwardness until the hearing has received appropriate tests. The simplest test for hearing is made with a watch. A number of persons with supposed good hearing should be tested first so that the average distance of hearing for that particular watch may be gauged. The same watch should afterwards be used in all cases tested. The test is to be made in a quiet room, and the child must not be allowed to see the watch. The watch should first be held at the distance at which it was heard by the average ear, and then be moved nearer and nearer until the tick is audible. It would be well to test the power of the voice in children proven defective by the watch test. The children are to be placed with their backs to the teacher so as to avoid the possibility of lip reading. The teacher starts at the distance of twenty feet from the pupils and gradually moves closer while speaking until his words can be heard

and repeated by the children. He will thus learn at what distance he must stand from the class, in which these children are, while giving them exercises.

CHAPTER VI
THROAT ABNORMALITIES

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THROAT ABNORMALITIES

WE have made mention of the fact that deafness is often associated with diseases of the throat and it will be appropriate to consider here also, throat abnormalities which directly influence the voice. These are often due to the rapid development of the larynx which occurs in boys from fourteen to sixteen years of age and in girls a year or two sooner. During the time occupied by this change the throat if not properly cared for, may be hindered in its development, a chronic "cracked" voice being the result. During this period voice exercises must be regulated so that the vocal cords will not be unduly strained. Singing exercises are to be limited and the pupils should not be encouraged to reach high notes. During singing lessons the teacher should no-

tice that there is no excessive action of the upper chest, this being a sign of abdominal constriction. It is very necessary to see that there is no impediment whatever to the abdominal muscles caused by tight belts or corsets, for this prevents the production of the voice in its natural manner and causes fatigue. If the collar bones are seen to rise and fall excessively it is very probable that the abdominal movements are difficult or impossible, due to a constricted abdomen.

A very common cause for hoarseness is to be found in laryngitis brought on by exposure to draughts, sitting during school hours with cold, wet feet, etc. Sudden exposure to cold air after prolonged sitting in a warm close room, may give rise to disturbances of the larynx. On coming out of a warm, badly ventilated room into the cold air, the mucous membrane of the larynx suddenly relaxes and the finer blood vessels become engorged and inflammation ensues. This is one of the many reasons why the schoolroom should be kept at

a moderate temperature and should be well ventilated.

The use of iced drinks or extremely hot drinks relaxes the mucous membrane of the throat and should be discouraged. Muffling up the throat is not a good practice because it lessens its normal resistance. Over indulgence of this kind is injurious because it destroys the power to withstand the effects of slight changes in temperature. The hardest specimens of American manhood are to be found in our navy, and these go the year round without any covering whatever to the throat, and are not troubled to any extent with diseases of that organ.

Children, either from timidity or carelessness, are apt to fall into the habit of speaking in a mumbling manner with teeth closed and lips half open. This causes imperfect breathing and incomplete aëration in the lungs. These cases should be taught to speak in a natural tone and to articulate

plainly. This timid habit may be overcome by habitual exercises so that reading or speaking will be neither painful nor injurious.

CHAPTER VII

ABNORMALITIES OF THE EYE

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ABNORMALITIES OF THE EYE

IT is beginning to be generally recognized that the modern requirements of school life often result in serious injury to the pupils' eyes. Not only do conditions which interfere with the child's vision retard his mental development but they are often a menace to his physical welfare. A great many children struggle along at schools with severe headaches and lassitude caused by eye strain. They may have blurring of vision so that the print looks indistinct and confusing. An effort to see print causes a sense of weariness and fatigue in children who have errors of refraction, conditions in which the rays of light do not focus on the retina without an excessive amount of muscular effort. When such conditions exist the child brings all his

surplus nervous energy into use in order to cause the light rays to focus correctly. There is a constant leaking of nerve force. Is it a wonder then that the muscles get tired and fail to act occasionally? Is it a wonder that the child is nervous and that his head aches, or that he is unable to keep up with other children in his class?

No other organ of the body is as easily injured by improper usage and care as is the eye, and no other organ has less power of re-establishing a normal condition after mischief has been done to it. Excessive school work at an early age, before the coats of the eye are strong and firm; incorrect position of the book while reading and prolonged periods of "cramming" in later school years when children are overpressed for show or for pure vanity, all work their baneful influences on the eye.

The eye should be considered as an optical instrument of rare delicacy, and it should at least receive as much care as would an expen-

sive instrument purchased from an optical house. Often it does not get this care but if we could look into the future of these mistreated cases and see the misfortunes which await them, we might hope for a correction of the tendency to disregard its proper care.

Excessive strain upon the eye brought about by the incorrect focusing of its muscles, or from prolonged periods of study without the proper time for rest, will not only permanently injure the eye but will demand an excessive amount of nervous energy with harmful results to the health generally.

The body has been aptly compared to a manufacturing establishment. The brain is its superintendent who sits at his desk where he receives communications from the various departments and sends out to them the desired instructions. The stomach department, the eye department, the liver department, are regulated at his command, and when all are working in harmony there is an equal distribution of his attention to these organs. If for any

reason there is a disturbance in one department, his whole attention is directed toward regulating its grievance, and the other departments suffer from neglect. So in eye strain, when the focusing muscles fail to do their work, the brain in an effort to supply them with the necessary nervous energy neglects the other organs in proportion, and in addition to the harm done the eye, the work of physical deterioration begins.

The organ of vision is a globular body placed in the orbit which protects it. Reduced to its simplest parts, it consists of the *cornea*, which is often spoken of as the glassy part of the eye. It is tough, transparent and slightly more convex than the other coats of the eye. The side and back walls are formed by the *sclera*, a very dense membrane. It is opaque and perforated behind by an opening through which the optic nerve enters. Just within the sclera and attached to it is the *choroid*, a layer of pigment in which are set most of the blood vessels of the interior of

the eye. As this coat extends forward there is a gradual change in the arrangement of its cells and fibers until it reaches the front of the eye where it goes to form the *iris*, a delicate curtain which regulates the amount of light that the eye needs. This curtain is of different color in different individuals. In the blond it ranges all the way from a hazel to a blue; in the brunette is in medium or dark brown. When one looks into the eyes of his friend it is this iris which is seen, and much of the "expression" which the eye has is due to the color and markings of the iris.

The light enters the eye through the *pupil*, which is seen as a black spot, the "sight," in the middle of the iris. It contracts and expands in order to regulate the amount of light which the eye needs. The action of the pupil may be studied by watching an eye closely while it rests upon a light and then is turned to a dark corner of the room. In the former position it contracts in order to shut out an excess of light; in the latter position it grad-

ually expands. In going from the light into a dark room, objects are obscured at first and then gradually appear. This phenomenon is due to the fact that on entering the room the pupil was contracted and later, acting under the influence of the diminished light, its gradual dilation occurred.

The optic nerve after it enters the globe, is spread out over its walls and forms the *retina* which is the receptive apparatus of the eye. Upon it the image is focused and the picture thus formed is transmitted to the brain. Its most sensitive portion is known as the "yellow spot" and the focusing apparatus of the eye directs the light rays so that they fall upon this sensitive spot.

The *crystalline lens* is a flexible, transparent body contained in a capsule, and is placed directly behind the iris, with an attachment to the ciliary or focusing muscle. Its function is to contract rays of light and cause them to fall upon the retina where they are received and carried to the brain in what we call sight.

When we look at objects near at hand this ciliary muscle comes into play and contracts the lens, making the short rays of light fall on the retina at the necessary point.

The various excursions of the eye within its orbit are controlled by a set of six muscles. Four of these muscles are used in directing the eye from side to side and up and down. These are called the *recti muscles*. Two other muscles, the "*obliques*," are used to give the eye a rotary motion. The action of these muscles is such that rays of light coming into the eyes from different distances are focused without the consciousness of their possessor. The closer an object is to the eye, the more must it converge, and by these muscles the act of convergence is produced.

The eye has been frequently compared to a camera. To one who has a knowledge of the one, the mechanism of the other is readily understood. The outer coat or sclerotic corresponds to the body of the camera box.

The cornea, or front part of the eye, takes the place of the point through which light enters the camera, and the black paint on the inside of the camera has its duplicate in the dark pigment or choroid in the eye. They are both used for the absorption of light.

The amount of light entering the eye is regulated by the iris; in the camera the sliding screen serves the same purpose. The crystalline lens and the camera lens have the same function to focus the rays of light and form an inverted image on the screen behind. In the eye this screen is the retina, in the camera it is the sensitive plate, or film. The film of the camera receives the rays of light, after which they are transferred to the photograph; the retina takes the impression and transfers it to the brain and a visual image is made. To one who wishes to receive a valuable lesson on the eye a quarter of an hour may be spent to great advantage in taking a camera to pieces and examining its parts.

In the preceding illustration we have spoken only of the normal eye in which light rays focus correctly. While the camera is a mathematically correct instrument, the eye unfortunately is rarely so. The majority of eyes met with in actual life, vary considerably from a mathematical standard, and are poorly adapted, without much strain, for close vision or for seeing at a distance. The reason for this is that at birth the eye is more or less flattened and will remain so unless circumstances are favorable to its developing a normal shape. Among nomadic people the eye is usually perfectly developed, but in civilized man the normal eye becomes abnormal because of its rarity.

Nearly all school children have errors of refraction of a greater or less degree. By this is meant that the light rays as they enter the eye do not focus properly on the retina without an excessive amount of strain to the ciliary or focusing muscle. In the normal eye the light rays reflected by the cornea and crys-

talline lens come to an exact focus on the retina without any muscular effort whatever. It will be easy to understand how such an eye will perceive distant and close objects with the same degree of comfort.

CHAPTER VIII
COMMON EYE DEFECTS

CHAPTER VIII

COMMON EYE DEFECTS

FAR SIGHT

THE most common eye defect from the standpoint of light refraction is "far sight." The farsighted eye has its axis from front to back shorter than normal. We have already observed that at birth all eyes have the short axis. A picture falling on the retina in such an eye will make a blurred image without the help of the focusing muscle. When the eye looks at distant objects, this muscle acts or "accommodates" in order to bring the focus correct so that the object will be seen clearly. But now should the eye attempt to see objects near at hand, it can not possibly get a distinct image. The object looks blurred because the eye has used up all of the focusing

power or accommodation in viewing distant ones. A child with this defect fails utterly at school. What the more fortunate children see clearly, he fails to see. During the weary hours of the day his ciliary muscle is tugging and straining at the crystalline lens in an effort to make the light rays focus. He soon uses up his reserve nervous energy, the eyes act for a few minutes and then "let go" and the print blurs. He has constant headache, becomes apathetic or is nervous and fretful. His lids itch and burn and his eyes become red and watery. Gradually an aversion to all near work is developed; study is avoided and his attention is turned to out door sports for he sees these sufficiently well to enjoy them.

Now let us put a convex lens in front of this eye. This lens concentrates the light rays and causes them to focus on the retina in the proper manner without any effort upon the muscle. A wonderful change is brought about. Close work now becomes a pleasure. The headache ceases and the nervousness dis-



GIRL WITH STRABISMUS OR CROSSED EYES

Following picture shows same child wearing correcting glasses

appears, because the leakage of nerve force is stopped.

CROSSED EYES

In neglected cases of farsight, strabismus or crossed eyes is apt to result. It seems to be a law of nature that the more the ciliary muscle is needed in "accommodation" the more convergence occurs to the eye. A very strong impulse is given to turn the eye in when "farsight" exists. In cases of this character the drawing in of the recti or converging muscles goes on until the child develops double vision. When he looks at one object, two objects are seen, a very confusing phenomenon. Eventually he learns to disregard one object. In other words he finds, unconsciously to himself, that he can see better with one eye than with two, and the crossed eye follows the course of least resistance which is a turning inward toward the nose.

This very unsightly and injurious defect may be prevented, or corrected when estab-

lished, by wearing correctly adjusted lenses. It is very important that these cases be attended to as soon as discovered because the retinal fibers of an unused eye atrophy or waste away from disuse.

The majority of unused eyes go wholly or partially blind; besides the eye in use is subjected to twice its normal work very much to the detriment of its possessor. In children who have reached the age of twelve or fourteen years an operation usually has to be done, a fact which intensifies the importance of correcting this defect earlier in life when well fitted lenses are all that is necessary.

NEAR SIGHT OR MYOPIA

Cases of nearsightedness are less common than the farsighted ones, though they are not so apt to escape notice. This defect is due to an elongated eyeball in which light rays from a distance, instead of focusing on the retina, come to a point in front of it and cross, thus making a blurred image. We have seen that



WEARING GLASSES FOR CORRECTION OF STRABISMUS

Same child as shown in preceding picture

children are born with flat or "farsighted" eyes. The eyes which have a tendency to short sight, gradually pass from the flat to the elongated type. Under favorable conditions the eye tends to assume a normal shape as adult life is reached and becomes approximately spherical. When close vision is encouraged in infancy, and when excessive use of the eye is permitted in early childhood the elongation of the globe is hastened and the child becomes shortsighted.

It is thus clear that the demands made upon the pupil by our modern system of education are often responsible for this deformity. It is more often seen in children who are suffering with physical or nervous disease than in the healthy ones. The schools in the congested districts of our large cities invariably have an enormous preponderance of shortsighted pupils. Unfortunately this condition often progresses as the child advances in age and in extreme cases continues to get worse steadily until middle life is reached.

The correction of shortsight in school children consists of the adjustment of concave lenses which spread light rays and in the careful regulation of the amount of work that should be done. Writing periods should be very brief, for this character of work is particularly trying to the eyes. Home lessons should not be permitted. In the majority of homes there are neither proper desks nor proper light. The lack of the former tempts the child to assume incorrect positions, thus aggravating the defect. Bad light causes strain which certainly does not promote a development of the eye toward a standard; besides the eye tires after a long day's work and is not in a fit state to be used.

Long hours are harmful because they give rise to a congestion of the ocular blood vessels and a strain of the muscles used in focusing. This strain differs from other kinds of physical exertion. Cases of near sight should be encouraged to live out of doors as much as possible and to use their eyes for distance. If

this is persisted in a relaxation of the muscles is brought about and a tendency of the eye to assume a normal contour is produced.

ASTIGMATISM

Astigmatism is a condition which gives rise in school children to a great deal of discomfort. In this disorder the eye has what may be termed a double focus. The horizontal light rays, for instance, may focus on the retina while those in the perpendicular meridian come to a point in front of the retina. This is due to a lack of correct curvature of either the cornea or crystalline lens. If one should look into the bowl of a highly polished spoon, he may be helped to understand this phenomenon. If the spoon is held vertically the focus is lengthened; if held horizontally, it is widened. There is an over focus in one direction and an under focus in the other. Now this is just what happens in the astigmatic eye. The rays of light as they pass through the cornea and

lens are not brought to one point and a blurred image falls on the retina which necessitates muscular strain before it can be equalized.

The child with a high degree of astigmatism suffers constantly from headache and nervousness because of this strain. He is apt to form the habit of blinking his eyes and holding his head in unnatural positions in an unconscious effort to shut out the offending rays. While this abnormality gives rise to untold mischief if not remedied, it may easily be corrected with cylindrical lenses adjusted so as to equalize the focus of the light rays.

There seems to be a prejudice in the minds of parents and some teachers against the use of glasses for children, because "they depend so upon them." It is true that the child will have to depend upon them but this is no reason why he should be denied them any more than a child with a diseased spine should be denied a brace which gives him support and relieves his pain. What he saves in wasted nervous energy, with

all the ills incident to it, will more than compensate him for the trouble his glasses will cause him.

TRACHOMA

One of the greatest menaces to pupils' eyes is trachoma or granulated lids. This disease does its work so insidiously and its effects are so permanent and disastrous that it has become a positive peril in the schools. The importance of preventing the spread of trachoma has only recently become recognized by our immigrant authorities. The examination of all immigrants is now carefully done, however, and all infected cases are excluded. About six thousand immigrants were sent back last year from New York alone. In some European countries trachoma is responsible for an appalling per cent. of blindness. In Hungary one-third of the population is affected by it. Its great prevalence there prevents the maintenance of a standing army free from it. Many of the recruits accepted for serv-

ice have trachoma and they are treated and kept in a semi-quarantine until they are either discharged from service or cured.

Fortunately the disease seems to be milder in this country than in Europe, though even here it is responsible for a large per cent. of the cases in our asylums for the blind. Because of its contagious and infectious nature, and the mildness of its symptoms in the early stages, all schools should be regularly examined and the cases discovered be excluded. This precaution followed by appropriate treatment of the infected cases offers the only hope of its eradication.

CHAPTER IX
THE CARE OF THE EYE

CHAPTER IX

THE CARE OF THE EYE

IN order that the eye should be made to cope with the demands made upon it in after years, it should receive the most careful attention during school life. A child should leave school with at least as good eyes as he had when he entered. Under a rational system of education, they should improve rather than deteriorate. Unfortunately educators, by disregarding the capacity of the eyes for work, and the simple rules for promoting the welfare of the eyes of the pupils, often do an incalculable amount of injury to this delicately complex organ.

When a child leaves home and enters school the parents' responsibility during school hours is transferred to the teacher, and the teacher cognizant of this responsibility will do every-

thing possible to conserve the good health and good vision of the pupils.

The teacher who observes the essential precautions necessary to prevent injury to the eyes of his pupils, will see that the room is well lighted. The light should be tested in every part of the room which is occupied. The desks should be placed so that the light will fall from behind. It should fall upon the child's work from the left so that shadows will not be cast by the head, shoulders and hand, in writing. Under no circumstances should the children sit facing the light.

The pupils should sit erect with desks so arranged that their work is not more than thirty degrees below the level of the eye. Stooping over print brings undue strain upon the external eye muscles, besides in this position, the blood gravitates to the eye and a congestion is soon set up. Every school room should possess a Snellen's test chart which may be obtained from any optician. With this test it is a very simple matter for a teacher to de-

termine in a few minutes whether the child needs the attention of an oculist. If the pupil can read the "20" line at a distance of twenty feet, it becomes evident that little, if any, eye strain exists. On the other hand, those proven defective by this test, those with red congested eyes, who peer and blink when they apply the eyes for close vision, or those who hold the head sideways or slanting, the squinting cases, and the ones who tire quickly and complain of headache should be sent to the parents for appropriate treatment.

Such a course on the part of the teacher would not only prevent much suffering and injury to an important organ but a possible loss of an invaluable sense.

CHAPTER X
BAD POSTURES

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BAD POSTURES

IT is very important that pupils be instructed in assuming correct postures during school hours. Permanent deformities have been caused by incorrect positions long continued. Especially is this to be noticed in children in whom the general physique is below normal.

Distorted spinal columns, sunken chests and stooping shoulders with their attendant physical ailments are often seen to follow a disregard of this very important precaution. The question of correctly made desks and seats has attracted a great deal of attention recently, and it is commendable that most schools are immeasurably better equipped at this time than in former years, yet some teachers are prone to give more attention to the desks than

they do to the pupils. A good desk is unquestionably better than a poor one but the modern completeness of equipment is apt to divert our minds from the essential points in maintaining good postures.

The posture of the child should be closely supervised by the teacher. The ideal position when sitting is one where the body is placed symmetrically. Bodily positions are maintained by the skeleton and its muscular support. Where the muscles are in modified activity, as they are when the child sits properly, no harm will result, but where the pupil stoops or twists the body upon itself a part of the muscles only are at work supporting the frame. This, long continued, goes beyond the point of exercise and becomes strain which is as harmful as exercise is healthful.

The correct posture during study hours is one in which the body is held symmetrically, for then, what may be termed muscular economy is attained. In such a position, the pelvis rests firmly upon the seat, instead of being

tilted and the thigh bones support part of the body weight. The spinal column is erect and maintains a normal curvature and the head is so placed that it does not overwork the muscles of either the front or back of the neck. The frame is in what may be termed a state of balance, and the position is maintained more by gravity than by muscular activity.

The child's back should be suitably supported by the back of the seat and the desk must be accurately adjusted to meet his necessities. The feet, instead of dangling a few inches above the floor, should rest firmly upon it. If the seat is too high, the child's circulation is impeded by his supporting the weight of his legs with the back of his thighs. There is also an undue tension upon the leg muscles, which is tiring and injurious. The back rest inclined slightly backward, should be of such a height that it fits under the shoulder blades, bringing the support about the small of the back where it is most needed.

The desk must not be set so far forward that

the pupil has to lean over or so low that he has to stoop. It should not be too high necessitating the raising of the elbows and shoulders to reach up to it. Leaning over low desks produces a rounding of the back and a contracting of the chest. Leaning forward increases the dorsal curvature of the spine and decreases the lumbar curvature. A constriction of the ribs is also produced, resulting in a contraction of the chest cavity and a reduction of its capacity. In addition to this the front part of the abdomen becomes folded upon itself and its contents are constricted.

Desks and seats of various sizes to meet the requirements of the pupil should be provided. In other words the school furniture should be made to fit the child instead of the child being distorted to fit the furniture.

Faulty positions in reading are potent causes for various eye defects. When reading the pupil should sit erect with the book held at least fourteen inches from the eye. Leaning over the book brings the eye too close to

the print and is thereby responsible for many cases of shortsightedness. The closer the eye is to the book, the greater must be the degree of convergence of the eyeballs, and the more intense the strain, besides the sweep of the eye at close range is greater than at a longer range and the demand upon the extrinsic muscles is increased.

In Germany the tendency toward shortsight is so great that the authorities in some of the schools have, of late, been trying to overcome it by peculiarly constructed desks. The writer visited one of these schools sometime ago where he had the opportunity of examining these rather crude appliances. They consist of bars of iron attached to the desks in such a manner that the pupil finds it impossible to bend over his work. These are used, of course, only on the desks of pupils who are found to be developing near sight.

Children are often allowed to read small print at too early an age, while the coats of the eye are delicate and easily deformed, and this

inevitably produces results which are as unfortunate as they are permanent. Concentration of vision for long periods in young children is liable to be exceedingly injurious to the eyes. Ocular defects are rare in the young who are reared in the country among healthful surroundings and who, instead of being crowded at school, have spent much of their time in the open air. In the country vision at long range is constantly practiced, thereby offsetting the evil effects of school work.

Every acute observer has noticed that sailors, surveyors, hunters and other persons who exercise their eye muscles out of doors have good sight and that the housed-up college student is usually suffering from some defect in vision which he has had corrected by glasses. This seems to be a penalty inflicted upon us by nature for our modern methods of obtaining "book learning." This tendency toward errors of refraction may be overcome in a manner by more exercise out of doors

where the eye is exercised and strengthened by distance vision.

While, as already noted, the demands of school life work physical hardships upon children and often result in permanent injury to the eyes, judicious training of the pupils in the proper methods of holding the book and assuming proper positions will, to a great extent, protect them from this kind of physical deterioration.

WRITING

Inspection of the back of a normal child will show a convexity of the vertebræ or backbone between the shoulder blades and a concavity at the loins or small of the back. These are the natural curvatures of the spine, which besides giving grace to the body, equalize the gravity of the trunk while the erect posture is being maintained. But if this column of disks composing the spine are seen to deviate to one side or the other it constitutes a de-

formity. Many children in school are seen to have this lateral bending of the spine and it has been found by authorities on the subject that, in many cases, the cause may be traced to incorrect writing postures.

One very harmful position for writing is where the right hand and arm are supported by the desk, while the left arm dangles downward unsupported. The weight of the body with the child in this position, pulls the muscles of the back in one direction and the process of curvature is begun. In children all of the bones are soft and pliable, and an incorrect position which would produce no lasting effect in an adult will be the cause of results in a child which are irremediable. Even slight curvatures in children's spines lead to a further deviation from the perpendicular during the course of growth and they, besides causing a loss of appearance, predispose to a general deterioration in health.

Children in whom these lateral curvatures



INCORRECT WRITING POSITION
Note the lateral curvature of the spine

are found usually have illy nourished muscles. They are the neglected children who are brought up with insufficient outdoor exercise. This may be suggested as an illustration of the ill effects resulting from lack of physical instruction in the schools. It has been observed that when classes receive calisthenics daily and where out of door games are encouraged there is a diminution in this lateral curvature.

Writing is an extremely complicated and special act and is always a severe trial to the young child. In early youth the child has not learned to use a few of his muscles at a time but has a tendency to use groups of muscles together. In the act of writing he must use a few muscles from several groups. The effect is to produce an unnatural strain to the body, the position of which he frequently changes in an effort to relieve the tension and fatigue that is brought about. He crosses his left leg over his right one, resting his weight on the right side of the pelvis and

this position more than any other he could assume assists in increasing the curve of the spine which has already been commenced by drooping his left shoulder. He leans forward compressing the abdominal contents and forces them into unnatural positions. In this position he brings his eyes too close to the copy, the neck is twisted so that the axis of vision is perverted by one eye being on a different level from the other and this may be one of the fruitful causes of shortsight.

The writing lesson should come immediately after a period of exercise, which stimulates the resistance of the trunk muscles and restores their tone. Writing should continue but a brief time without a pause for rest. A minute's rest occasionally will help the muscles to relax, after which the writing may be continued without inconvenience. These simple measures put into use, will to a great degree prevent the evil results of the most physically trying act of school life.



BAD STANDING POSITION

In this position the pelvis is tilted and the spinal column curved laterally.

STANDING

The positions for standing in classes should depend upon how long a period the child is obliged to be upon the floor. The ideal position for short periods is one where the heels are slightly separated and the weight is equally divided between the two legs. With the body symmetrically placed the weight is thrown slightly on the balls of the feet, the shoulders are thrown back and the head is erect with the chin drawn slightly inward. This position, ideal as it is for short periods, can not be kept long without fatigue. The rigidity of the pose after a time produces an unnatural strain and is followed by a desire to alter the position of the body for the purpose of relieving the tension and fatigue that is produced. In order to relieve the tension the child has a tendency to relax the vertebral column, bend the knees slightly and throw the head forward. This is a position as bad as can be imagined.

After short periods of standing the child, if correctly instructed, will slightly advance one foot, thereby bringing the weight of the body on the posterior leg, while the muscles of the forward one are relaxed and resting. This position may be varied by alternately placing the opposite foot in advance. Such slight changes in posture are the best remedy for relieving the fatigue and preventing the awkward standing positions which are fostered in badly conducted schools.

CHAPTER XI
NERVOUS DISORDERS

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NERVOUS DISORDERS

THE seat of nervous force lies in the nervous system. This is true of bodily force as well. From the nervous system is received the power which makes the heart to beat, and which causes the other organs of the body to perform their various physiological functions. The physical machine may be said to be driven by brain power. The brain not only governs the machine but in turn is governed by it, for its structure is dependent for nourishment on the very organs under its control. Thus will fright, worry or suspense cause a derangement of digestion, which will in turn lead to improper brain nourishment and eventually will terminate in a permanent disability to the functions of both brain and stomach.

School work is the cause of much brain activity. The child's brain in action uses up a portion of its tissues, which must be removed and replaced as fast as used up, if its equilibrium is to be maintained. This balance can only be kept up when plenty of time for rest and sleep is given. When the brain is "crammed" with intellectual work, and when insufficient time is given for the removal of brain waste, and for brain repair, the nervous system suffers and the seeds are sown for a full harvest of nervous disorders.

Nearly every teacher will be able to call to mind cases of precocious children which illustrate this rule. Exceptionally rapid mental growth is sometimes to be found in children of an irritable temperament. This emotional, restless disposition gives rise to an ability to grasp mental problems with great rapidity. Ambitious parents often urge their children on in their intellectual pursuits until a period of brain fatigue is reached, and they become

victims of one or more nervous diseases. A teacher should regard a child of this type with grave suspicion. They should see in this precocity evidence of weakness, not strength, and should seek to restrain rather than encourage the child's aspirations to outshine its fellow pupils.

The nervous system is built up slowly and its over stimulation will rarely fail to produce destructive changes. An expensive electrical machine may be destroyed in an instant by a lack of observation of the laws of electricity, and a machine of this kind will rarely be found in the hands of a novice. If the teacher will realize that in his precocious pupil he has to deal with a machine which is regulated by laws as infallible as those governing an electrical device, which machine may, if not supervised properly, destroy itself automatically, he will, by prudent restraint, avert the catastrophe of a nervous explosion.

Actual brain disease is often due to a failure

to recognize in the exceptional mental activity of school children the danger signal of a lamentable fall.

CHOREA OR SAINT VITUS DANCE

Saint Vitus Dance is a very distressing nervous disorder which is not infrequently found among school children. This unfortunate condition is characterized by irregular, spasmodic movements of the voluntary muscles. In mild cases there will only be noticed a tendency toward clumsiness in the child, or an uneasy, spasmodic shuffling of the feet or slight jerking movements of the hands. In others a tendency toward twitching of the muscles of the neck may be the only symptom observed. In more pronounced cases many groups of muscles are affected and the child jerks violently. Often the muscles of the face are involved, giving rise to a series of grimaces and curious twitching of the lids, lips and angles of the nose. The speech is often disturbed, articulation at times being impossible. All

the symptoms are exaggerated by excitement or by the knowledge that someone is watching. There is often a distressing opening and closing of the mouth, the jaws being violently snapped together. In other patients the tongue is quickly protruded and withdrawn. The diaphragm is sometimes involved, giving rise to a series of jerking grunts.

When the leg and arm muscles are affected there may be a constant repetition of purposeless movements caused by repeated spasms of the same muscle groups. In severe cases the patient may be unable to walk or to help himself in any way. In many cases the groups of affected muscles become exhausted so that a condition simulating paralysis results. Mentally the child is extremely irritable, and is unable to concentrate his attention for more than a brief period. He is entirely unfit for school work, and attempts at concentration only increase the bad effect of the disease.

St. Vitus Dance may be found in children of all ages, but it occurs most frequently be-

tween the ages of seven and thirteen years. Many conditions have been mentioned by writers as predisposing factors in its production, the most common of which are diseased tonsils, errors of vision, intestinal disturbances and over pressure at school. Statistics leave no doubt that the disease occurs oftenest among overworked school children in whom the general physical condition is below normal.

School work always intensifies the symptoms and in all cases should be discontinued. The child must be taken away from companions who ridicule him if good results are to be obtained. Everything which tends to irritate him should be eliminated and close attention should be given to his general health. Nearly all cases recover in a brief period if judicious treatment, with careful management, is carried out.

HABIT SPASM

Closely allied with chorea, and often confused with it, is the condition known as habit

spasm. In it we find spasmodic movements of the muscles, usually of the face, which are confined to one group. These spasms are most commonly found to affect the muscles at the angle of the mouth, or those of the eye lids, though other groups are sometimes involved. At first the movements are scarcely perceptible, or may escape notice entirely. If persisted in they become more marked and occur with greater frequency.

The child blinks or twists its face and continues to do so even when reprimanded. Punishments never help, and often exaggerate the condition. The chiding of fellow pupils aggravates the symptoms and the condition progresses rapidly until the child is taken from school. In neglected cases the disease may become permanent and continues through life.

The cause is often to be found in perverted general health associated with a neurosis or nervous temperament, either inherited or acquired. The object of the treatment in these cases is to remove the cause. The eyes should

be examined for muscular errors, the nervous system should be built up by rest, appropriate food and sufficient sleep, and school work should be entirely suspended.

HYSTERIA

The exaggerated nervous irritability of over sensitive and overworked school children sometimes manifests itself in what is generally known as hysteria, a term used to designate a great train of erratic symptoms of nervous origin. Many pages might be devoted to an enumeration of the different symptoms which find their way into the classification of hysteria. They range all the way from nervous headache to convulsions and profound catalepsy. Teachers have most to deal, however, with the class of children who are ultraemotional, who are easily moved to outbursts of either laughing or weeping, or to hysterical fainting, followed by more or less prolonged unconsciousness. These symptoms, even though mild in their nature, should be

the cause of much solicitude, for from this class of nervous children are recruited the inmates of our asylums late in life if proper attention is not given the condition at its onset.

A hysterical fit is not attended with any immediate danger and seldom occurs when there is no one present to observe it. It may usually be recognized and distinguished from other spasms by a slight quivering of the lips and eyelids, and a tendency to close the lids closely after they have been opened. The greatest danger is not immediate but remote. The symptoms indicate a disturbed mental equilibrium. A physician should at once regulate the treatment and discipline of the child, which treatment will have in view the eradication of predisposing causes. The future of these, more than any other class of children, depends upon proper management, and only by such judicious management will many a child be spared from becoming a resident of a hospital for the insane later in life.

Hysteria, like other nervous diseases, is

caused by destructive changes in the brain and the cause of these changes should be sought for and eliminated. In many cases the abnormalities will be found dependent upon the evils of our modern artificial civilization. An attempt to squeeze the brain into the particular shape fashioned by a school curriculum often ends in an attack of hysteria.

The term "overpressure" at school seems to have been formed with the idea that a certain amount of pressure at school is indicated. This is all wrong. Education should be a natural process, children should be as well from a physical standpoint at the end of the term as they are at the beginning. If they are taught to observe the fundamental laws of health during the school year, if the education is carried on with a view to growth and not pressure, if the system is one of drawing out and not crowding in, the process is a natural one, and the various nervous disorders and physical disturbances will be eliminated.

CHAPTER XII
DEFECTIVE CHILDREN

CHAPTER XII

DEFECTIVE CHILDREN

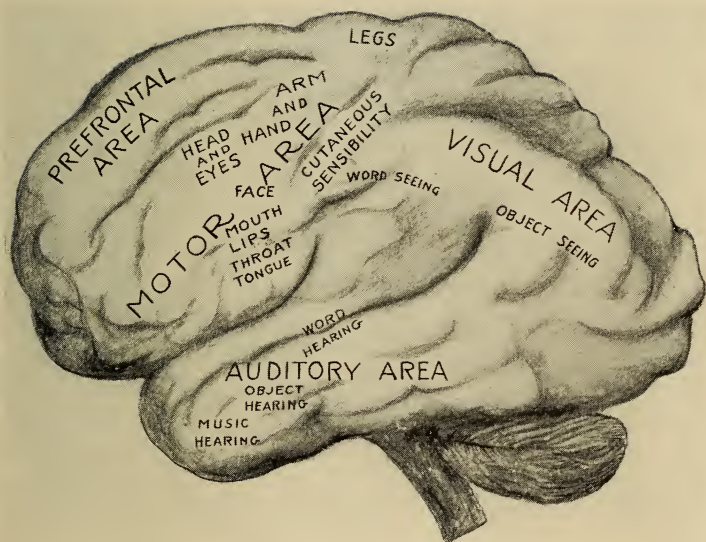
EVERY teacher has to contend with a class of children who, though not exhibiting signs of mental abnormality before school life is begun, remain more or less indefinitely in the lower grades and seem to derive little or no benefit from their class work. Many of these children are not mental defectives in the strict sense of the word, their inability to keep up with their classes being due to a defect of some of the special centers of the brain.

A child goes to school at the age of six or seven with the centers of his brain governing the special senses, motion, speech, etc., fairly well developed. This comes to him naturally as an inheritance from an ancestry dating back to primitive man. To all appearances he is

at that time a normal child. From an educational point of view, he may prove a defective child, however, even though he has hitherto appeared normal to his parents.

It has been conclusively demonstrated that the centers in the brain which have most to do with a child's education are not a natural inheritance and have to be built up by the child himself. This process of brain building is a slow one and in some children one or more centers refuse absolutely to develop and the child falls into the class of defectives. For instance, what is described by physiologists as the visual word or word seeing center refuses all stimulation and growth. In such a case the child sees the word plainly, but cannot distinguish it from other words. A defect in development of the auditory word center gives a confusion of spoken words.

This brain law has been understood only during the last few years, but the conclusions of physiologists regarding it are definite. A lover of music of to-day may to-morrow, by



SECTION OF BRAIN SHOWING SPECIAL CENTERS

an injury to the center of his brain governing his musical faculty, recognize in a symphony nothing but a jargon of sounds, and an artist, by an affection of his object seeing center may see nothing in his picture but daubs of paint. In neither of these instances is the special sense of sound or sight defective, the special centers only being at fault.

Injuries to the special centers in the brain are often due to cerebral hemorrhage. In numbers of cases localization of blood clots have been made by the effect produced upon special functions, the correctness of the localization being demonstrated by a trephining of the skull resulting in recovery.

Under practical, individual instruction children, in whom an acuteness of any given center is lacking, by much attention given to building these special centers, often make such improvement that their defects are entirely overcome, and they regain the place in their classes.

A more unfortunate class of children is to be found in those who, though not apparently

lacking in any one special center, seem not to respond to any mental stimulation whatever, all attempts at instruction in the ordinary class room seeming to be entirely wasted upon them. These children remain from year to year in the lower grades. The teacher becomes discouraged and they receive little or no attention. These children, through hopeless competition, become as discouraged as do their teachers, and, unless rescued, are doomed to a life of uselessness and dependence.

It is a great injustice to the mentally deficient young to allow them to remain in the ordinary class rooms. They should be transferred to classes, where by careful and judicious teaching under the auspices of someone skilled in the work, they may be developed to a more or less extent and a fair amount of intellectual progress may be made.

CHAPTER XIII
OVER PRESSURE

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OVER PRESSURE

EDUCATION of the young is a process which has in view the fitting of the child for the battle of life. True education is a stimulation of physical and mental development, in which no one part of the body or mental faculty is developed at the expense of another.

The pupil of to-day who develops his mind at the expense of his body, runs a great risk of being outstripped a little later on in the race of life by his fellows whose education has been wisely directed so that the healthy equilibrium between mind and body growth has been maintained.

In true education the brain is to be trained and not crammed. The child should be led and not driven, should be gradually molded,

and not squeezed into that particular shape laid down in a given curriculum. In a rational system of education, mental growth should not be considered aside from physical growth. If a balance between brain and muscle energy is not maintained, a certain amount of effete or used-up matter is kept in the body instead of being cast off, and this, sooner or later, acts as an impediment to proper brain work. While a child is in school it is more vitally important to look after its physical than its mental growth. A hindrance to the physical development of the pupil during its school life cannot be compensated for by any degree of mental accomplishment. During the years of school life, a child is either building up a good physique as it develops its brain or is paving the way by badly directed efforts to digestive, nervous and circulatory disturbances.

A close observer will notice that a child does its best work after a period of rest, that better results are accomplished early in the morning

and that the long drawn out home lessons are not only badly assimilated, but that this unnatural pressure of work more or less unfits it for the tasks of the following day. The requirement of such home lessons for young children is bad if the child's welfare is to be considered. During the day his mind has been applied more or less closely and a change of thought is essential to the healthy development of his brain power. Intense application uses up what may be termed his reserve nerve force. When this nervous reserve is interfered with he becomes pale, irritable and fidgety, has bad digestion and, if the cause is not removed, takes his first step upon the road which leads to neurasthenia and ill health in later years.

Brain tissue requires rest just as muscle tissue does. Toxins, the result of mental exercise, are developed in the brain during its periods of activity, and when they accumulate beyond a certain point no further mental work is possible. Mental fatigue in children, if not

properly relieved by diversion, rest and sleep, lays the foundation for future nervous and physical calamities. After the day's work at school is over, the evenings should be devoted toward building up this nervous reserve force and eliminating the brain toxins by rest, relaxation and play.

All authorities now agree that the education of a child should not commence too early, and when it begins it should be carried on with his physical welfare first to be considered. The school hours should be broken up into periods of instruction and relaxation, and the more systematic and pleasing the relaxation the more receptive will be the pupil's mind to instruction. If parents and teachers would keep in mind that over application is injurious to bodily strength, and that bodily strength controls mental growth, that education which interferes with the perfect development of manhood or that develops a girl's mind at the expense of her fitness for motherhood is the

worst form of excess, a great step toward human progress would be made.

Usually the first symptom of an untoward nature which appears in the overworked child is nervousness. This is most apt to occur in precocious, bright, energetic children. It should receive the immediate attention of parents and teachers, and be carefully treated by appropriate relaxation if the child is to be rescued from a life of uselessness for which his elders will be to blame. Nervous, overworked children are irritable, easily excited, they spend their nights in fretful slumber and toss restlessly about in bed.

Peaceful sleep is as necessary to the human body as food. Brain repair goes on at its best during the hours of sleep and only when the mind is dormant is complete rest established. Long hours for sleep are more important in children than in adults. Brain growth is going on and nature seems to require more time for brain renovation. During our waking hours something which may be termed brain

waste is stored up within us, and if not eliminated by sleep, kills us or drives us insane. During sleep both body and brain are in complete rest. If a sleeping child's hand is raised, it falls as if lifeless. No energy is being expended. The brain currents are at rest. Nature is at work throwing out the waste and building up the cells used up the previous day.

When a child is nervous and does not sleep, he grows pale and wan, develops headache, wears a strange frowning expression and acquires an unhealthy appearance generally. When these symptoms arise a long rest from mental application, with appropriate exercise and much time in the open air, is absolutely required. If the pressure at school is continued after these symptoms appear, and if illy advised methods of correction are instituted, there is danger of driving the child into a physical and mental breakdown with promise of lifelong misery and suffering.

To avoid the disastrous effects of overwork seen in some children, the teacher should study

closely the temperament of each child. A close observation of the actions and sayings of the different children should regulate the basis of their instruction. The precocious children should be held back rather than crowded. Precocity may mean a lack of mental equilibrium. Excitement and irritation of the brain may be the cause of a temporary ability to learn readily. Actual brain disease is often preceded by a period of exceptional acuteness of the intellect. This has been observed to a marked degree in persons developing paresis, but this acuteness is soon followed by dullness and delusions.

The routine of school work should be uniform. From a physical standpoint it would be better that the classes should undergo examinations at frequent intervals rather than have the supreme test preceded by the nerve racking process of "cramming" made at the end of the session. Pupils who absorb knowledge in this way rarely retain it and the great expenditure of nerve force occasioned by this

“system” of learning often results in permanent injury.

Competition is wholesome but it should last throughout the year and should not be used to stimulate a pupil to do the greater part of a year's work in a month.

Overwork in schools could be largely avoided by good classification, regular but brief periods of study with frequent intermissions for exercise. In this way there would be no unequal development between brain and body and a solid foundation for a building up of the special faculties would be laid.

CHAPTER XIV

EFFECTS OF POOR VENTI-
LATION

CHAPTER XIV

EFFECTS OF POOR VENTILATION

THE health of school children is influenced to a great degree by the character of ventilation in the school room. Impurities of the atmosphere may be responsible for a great many cases of illness, and good grades in classes can not be expected in rooms where the atmosphere is loaded with poisonous gases. Impurities of the air in the class room may be due to various forms of contamination, the most common of which is derived from the pupils themselves by the process of respiration. The effect of vitiated air containing organic matter from the body, together with gases produced by respiration, is headache, sluggish-

ness and occasional attacks of faintness. Children spending much time in such an atmosphere become pale, lose appetite and are subject to depression of spirits and general inertness. Such children, besides losing their normal resistance to disease, develop an inability to concentrate the attention, and study becomes a burden. With these facts in mind it becomes obvious that ventilation in the school must be good, and the rooms must not be overcrowded if its occupants are not to suffer both mental and physical deterioration.

As already noted, the atmosphere of an occupied room contains a great number of harmful vapors and gases, and in them germ life abounds and thrives in proportion to its contamination. Dust is always present and acts as carriers of microbes, thus assisting in the spread of disease. It is permeated with exhaled air which has been robbed of its oxygen and loaded with carbon-dioxide. It is also saturated with water vapor from the lungs containing many organic impurities. This

water vapor decreases the normal evaporation of moisture from the surface of the body, thereby causing much discomfort. The writer must say in all candor that he has seldom gone into a school in this country during working hours, especially in winter, without finding present to a marked degree, atmospheric contamination, for which overcrowding and insufficient ventilation are directly responsible.

To condemn children to breathe such air as this for several hours each day is to subject them to a destruction of their vitality and a tendency to the acquirement of all forms of disease. A child in whom there is an inherited predisposition toward tuberculosis, for instance, who is compelled to breathe a vitiated atmosphere, is apt to develop active symptoms of the disease in a few weeks or months, and to transmit the infection to others about him. Of all the vital questions to be considered in the school room that of clean air is by far the most important, because it deals directly with the health and the lives of the pupils.

The following table shows the composition of fresh air:

Nitrogen.	79.
Oxygen.	20.96
Carbon-dioxide.04
	<hr/>
	100.00

Air that has been exhaled from the lungs contains:

Nitrogen.	79.
Oxygen.	16.
Carbon-dioxide.	4.
Organic matter	1.
	<hr/>
	100.00

This table shows that in expired air the amount of oxygen is diminished and that carbon-dioxide is greatly increased, besides one per cent. of its composition is made up of harmful organic matter, which nature has thrown off from the body.

The most injurious of all the impurities to be found in exhaled air is carbon-dioxide. It is this gas that sometimes causes death to per-

sons who are confined in badly ventilated rooms. Six fatalities occurred recently in a penal institution of this country, which were directly traceable to self-poisoning from this source. In the famous Black Hole of Calcutta one hundred and twenty-three out of one hundred and forty-six persons met their death in one night from carbon-dioxide poisoning. Several similar catastrophes have befallen persons who have been confined in rooms with little or no ventilation.

Though carbon-dioxide contamination is never so profound as to cause death in the school room, these cases are mentioned to illustrate that, with poor ventilation we have to contend with a pollution of the air of a more or less dangerous degree. It is estimated that the average child of twelve years produces six feet of carbon-dioxide per hour by the process of respiration. With this in mind it is very evident that the occupants of a school room will deteriorate the atmosphere in a brief space of time unless the room is pro-

vided with the proper facilities for systematic ventilation.

Organic impurities in the air, due to respiration, consist principally of dead epithelium, which is a favorable soil for all forms of bacterial life. Emanations are also given off from the skin, and among poorly cared for children, decomposition of organic matter on the clothing is a factor in vitiating the atmosphere in the school room. Gases escaping from defects in plumbing are dangerous because of their poisonous character and of the injurious micro-organisms which they contain. The problems of artificial heating are also to be reckoned with. Combustion of coal liberates carbon-dioxide, besides sulphides of carbon and ammonia and other compounds of sulphur, all of which are deleterious in the extreme.

Pure air is as necessary to life as pure food, and this fact makes the problem of ventilation a paramount one. In small schools in the country and in the older schools in the city,

the question of providing the pupils with fresh air seems never to have been considered in any way, and some of the elaborate apparatus in the modern schools seem as inefficient as they are complicated. School authorities in selecting plans for school buildings rarely give attention to the provision of adequate floor space for the pupils. Nearly all of our schools are overcrowded and this close proximity of the pupils makes good ventilation impossible.

The first evil to be noticed in overcrowding is an elevation of the temperature of the room. The natural heat of the body is 98.6 and when overcrowding of the room occurs, the temperature of the air, by contact with the persons of its occupants, rapidly rises. The warmth of the atmosphere in the room will create draughts near the inlets for air and those sitting near them will be chilled. When the temperature without is colder than within, these draughts of cold air are complained of, the inlets are closed and the process

of contamination is increased. Sandwiching children as is done in some of our American schools is responsible for the persistent colds which attend many of them during the session and for the general physical perversion which others of them undergo. The Privy-council of London will not allow a school to have an annual grant which does not provide eight square feet of floor space for each pupil. This allowance does not cover wasted space. The institution of a similar rule in our schools, if adhered to, would prevent much physical injury and discomfort to our rising generation.

It is to be admitted that the air of all occupied rooms must necessarily be more or less polluted and the rule should be to supply enough fresh air to keep the impurities minimized so that they do not interfere with health. There must be provisions for free admission of fresh air and adequate openings for the escape of used up air. Two thousand feet of fresh air is required every hour for

each pupil in a room (Rolley's Hygiene), and in order to provide this there should be an opening of sixteen square inches per pupil, assuming that the air enters the room at a velocity of five feet a second. An outlet of the same size is necessary. In a class room containing forty-eight pupils there should be, therefore, an opening of five and one-third feet for the admission of air and one of similar size for its exit.

It is not within the scope of this little volume to enter into the principles of the various methods employed in ventilation. This chapter will do no more than call attention to the importance of ventilation, and as this is a subject that has been so generally neglected in the schools, no excuse is necessary for its introduction here.

CHAPTER XV
INSUFFICIENT EXERCISE

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INSUFFICIENT EXERCISE

IN order to overcome the evil physical results of school life a certain amount of exercise is indispensable. The development of the mind at the expense of the body is wrong, and children who grow to manhood or womanhood with this very important feature of their education neglected, often find themselves badly handicapped in the great battle of life.

Exercise by equalizing the action of the muscles, overcomes the tendency toward deformities occasioned by work in the classroom. Muscles which remain a long time inactive lose their power of concentration and fail to perform the harmonious movements which give grace to the frame.

A child growing up without the proper

amount of exercise, becomes awkward and ungainly and is unable to perform the acts requiring muscular dexterity.

Mind and muscle should be developed simultaneously. Exercise keeps the muscles in a healthy condition and under its influence they retain the power to act in direct influence to the will. Trained muscles act in co-ordination, relieving all expenditure of nervous energy. They may be said to act automatically. This is forcibly illustrated in the trained athlete who can perform certain feats, such as running long stretches, with less expenditure of energy than would be occasioned by the novice in making one half the distance.

Taking active parts in out-of-door sports teaches the child to see quickly and to act quickly. It increases his self-control and stimulates his judgment. Games bring about a certain relaxation which offsets the necessary but physically deteriorating effects of the restraint and rigidity of the class room. They quicken the respiration and increased

amounts of oxygen are thereby thrown into the lungs, and without this life giving the building of the muscles, nerve and bone, would not be accomplished. This increased breathing develops the thorax, gives its muscles tone and produces a permanent expansion of the lungs.

Exercise equalizes and quickens the circulation of the blood. In the class room where the brain is active, there is an increased flow of blood to the brain. The blood gravitates to the extremities and abdomen when it is not needed and a stasis of the circulation is thereby brought about, but when the action of the heart is increased by judicious exercise a redistribution of the blood to its proper places results. All evidence of congestion disappears and the spirits become jubilant and lively.

Supervision of school games is necessary, for without it the timid or weakly children are apt to be pushed out entirely. Teachers should avoid, however, making games stilted. The children's voices should not be restrained

and everything tending to abate their natural buoyancy should be avoided.

It would be a capital idea for every school to devote a brief period each day to regulated physical exercise, though this should never be done to the exclusion of out-door sports. Exercise given small children should be free from difficult or complicated movements, but should be limited to simple methods of developing the chest and increasing the respiratory process. As the child advances in age this exercise may, with impunity, be made more exacting.

CHAPTER XVI
TUBERCULOSIS

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TUBERCULOSIS

TUBERCULOSIS may be termed a disease of civilization. When Columbus discovered America, it was unknown among the natives whose lives from remote ages had been spent in the open air. The civilization which we have forced upon the Indian has been dearly paid for, for at the present the per cent. of tuberculosis cases is much higher among the Indian people than it is among the Whites. Indeed it is one of the potent factors which is gradually leading to their extermination.

The havoc being wrought by this insidious and disastrous disease is alarming. Despite the discoveries relative to the cause of infection, and the best manner of combating its spread, it is steadily on the increase. It is by

far the most common cause of death in this country. Our statistics show us that fifteen out of every hundred people succumb to its ravages. By incapacitating those affected with it from making a livelihood, it is the cause of a large per cent. of the country's pauperism. The amount of money spent each year in supporting its unfortunate victims is truly enormous and the wages lost by those afflicted is beyond the range of anything like adequate calculation.

It is now an established fact that the disease is caused by a special form of micro-organism called the tubercle bacillus. This germ may enter the body and attack any part of it. No bodily structure seems to have the power of establishing an immunity against its invasion. It may attack the skin and cause a slow but permanently disfiguring deformity. Its ravages upon the glandular system are even more serious and bones and joints, especially in children, succumb readily to it. The most frequent site of its attack is the lungs

and there it evidences itself in what is generally known as consumption. The intestines frequently suffer from its encroachments and even the brain is often affected, for tubercular meningitis every year gives us a very high mortality.

As has been stated, the determining cause of the disease is the tubercle bacillus. This organism has a great vitality when left in dust and dirt hid away from the light, but it succumbs almost immediately when exposed to the direct rays of the sun. Its spread is due to the promiscuous habit of spitting more than to any other cause. Unfortunately many consumptives through ignorance or because of a contempt for the welfare of others, spit about in a most reckless manner. The sputum lodges in the dust and when dry is blown about and, being inhaled by the passerby, finds lodgment in his throat and lungs.

Post-mortem examinations show that a larger per cent. of persons than was previously supposed, have been infected with tuber-

culosis, for the lungs examined in thousands of cases where death ensued from other causes, have shown healed up patches. This was evidence that the tubercle bacillus had at one time attacked these parts and had been eventually exterminated by nature. This was a hopeful discovery as it proved that, even when one is infected, increased bodily resistance, brought about by correct living, may defeat and exterminate the disease.

The popular idea that tuberculosis is inherited is a fallacious one. While in some families it may be noted that their history shows a number of cases of tuberculosis, it is now understood that heredity can only convey a predisposition toward the disease. In families where the mortality is high the explanation is, that conditions common to the family have produced the infection in its different members.

The inherited predisposition toward tuberculosis may be aggravated by a decreased vitality in the child brought about by condi-

tions such as measles and la grippe and other diseases of a debilitating nature. Injudicious feeding is a potent factor in stimulating the inherited tendency toward infection. It has been observed that bottle fed babies are more liable to infection later in life than those who have been breast fed because of the decreased vitality and weakened resisting power that these children acquire. And here we beg to say with no more candor than pity that the mother who willfully shirks her maternal responsibility, takes her infant from the breast and substitutes for its nourishment any of the artificial foods, is guilty of an act little short of criminal.

Badly kept dusty streets and dust generally, predispose to tuberculosis because through this medium the bacillus is most often conveyed to the lungs. City streets should be sprinkled before being cleaned, and the sweeping should be done after midnight instead of in the evening, the time selected by most of our civic authorities, who often seem more de-

voted to their own convenience than to the conservation of the public health.

In schools the floors should be lightly sprinkled and the rooms be cleared of all occupants during the process of sweeping. The vacuum cleaner, which now seems almost perfected, is an appliance which we hope to soon see in general use, as it draws the dust into a receptacle instead of scattering it about where it settles only to be redistributed at the next sweeping.

The way to consumption is often paved by bad ventilation in the home and school. Parents are prone to give too little attention to the proper air supply in the sleeping rooms of their children. The air of all occupied rooms is necessarily more impure than external air. Emanations are constantly arising from the body and the exhaled air is laden with carbon-dioxide, a gas which when concentrated, is sufficiently poisonous to cause death. Perfect ventilation in sleeping rooms is not easily accomplished, and for this reason it would be

better for us all if we would sleep out of doors. When this is not possible the supply of fresh air should be kept up by appropriate openings, so that an observant person on entering the room from the outside will not be able to detect the slightest degree of "stuffiness." In the school room the sensation of "closeness" is often perceptible to anyone who is a lover of fresh air. Badly ventilated schools are a menace to the health of its pupils. A lowering of the vitality of its occupants results, their nutrition is impaired and with bad nutrition comes decreased resistance toward infection, all of which are potent factors in abetting the latent predisposition toward tuberculosis.

The hackneyed adage, "An ounce of prevention is worth a pound of cure," applies to this disease more than to any other, for prevention here involves a wider range than the destruction of the germ. General cleanliness, proper attention to infant feeding and the education of the masses in hygiene and

sanitation are matters of vital importance in controlling the spread of tuberculosis.

Public buildings, churches, schools and other places where people congregate must be kept cleaner, better ventilated and freer from dust. The question of milk, that great conveyor of infection, must receive more attention from the proper authorities. If food for the young would be made plainer and of a more nourishing character, if the tidbits and digestion disturbers would be eliminated, the child would have a better start in life and would be more thoroughly prepared to withstand the encroachments of disease. Children known to be tubercular, should not be admitted to schools. Spitting ordinances should exist in all cities, and should be vigorously enforced, and a general campaign of education should not only be begun but should never cease. These fundamental laws of hygiene should form a part of the child's training at school and in this way they would be carried indirectly into the homes.

Children should understand the importance of fresh air and of exercise, the necessity of cleanliness, and the danger of spitting should be impressed upon them. Persons who are infected with the disease should protect the health of others by carefully depositing their sputa into vessels containing disinfectants or into cloths that can be burned. If these precautions are disregarded, the health authorities should enforce the spitting ordinance. One of the points to be impressed upon the mind of the public is that one consumptive, if careless, may be the cause of infecting many healthy persons. If the dangers of promiscuous spitting were thoroughly understood, every careless expectorator would be hailed with so much indignation that the habit would cease and the public health would thereby be conserved.

School rooms should be regarded as places which are apt to spread infection, particularly that of tuberculosis. Many of the schools in this country have never been properly cleaned

since they were built. A thorough disinfection of every room where children congregate should be made monthly or more often. Disinfectants scattered about the room will not suffice, for if they are not made strong enough to kill the occupants of the room, they will certainly have no effect upon the germ life in existence there. Deodorants are absolutely of no value, as masking an odor only makes one unconscious of its presence and gives a false security.

A bichloride of mercury solution 1/10000 is the most efficient disinfectant for floors and furniture. It is cheap, does not injure the hands and has no bad effect upon paint, wood or glass. Floors and walls should be scrubbed and desks and seats should be washed with this solution. Then the room should be closed and disinfected with formaldehyde gas or sulphur should be burned in it. If this is properly done the room, when opened, is entirely free from bacterial life and the danger of infection is nil.

While some of the measures mentioned here may require a little time and trouble and the expenditure of some money, if they are carried out it will be time and money well invested. A much better and more economical plan would be to safeguard the health of the children, rather than to take care of them after they become infected. Half of the money spent on tubercular hospitals in this country every year would cleanse all the schools in America. The prevention, by adequate means, of the terrible sacrifice of human life from this great white plague should be the ambition of every community, and this ambition can be directed in proper channels only by the education of the public in reference to the importance of correct living, sanitation and hygiene.

CHAPTER XVII
EPIDEMIC DISEASES

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EPIDEMIC DISEASES

ONE of the most important subjects, which has reference to the health of school children, is that which deals with prevention of the spread of epidemic diseases. An ordinary amount of precaution and intelligent observation on the part of the teacher will do much to prevent a single case of contagious disease from causing a school epidemic and possibly a general epidemic. Some of these diseases are only mildly contagious at the onset and a casual knowledge by the teacher of the prodromal symptoms manifested in each disease may be the means of preventing a general outbreak in the school, which would necessitate it being closed indefinitely.

A great many lives have been lost and un-

told miseries have resulted from a lack of this knowledge regarding the diseases which are likely to become epidemic. Measles, small pox, diphtheria, mumps, chicken pox, whooping cough, scarlet fever, etc., have certain easily recognized characteristics the detection of which in the school room is of the utmost importance to both teacher and pupils. These diseases are nearly all communicable through the air. In most of them, however, the distance required for infection is small, and only in one or two diseases mentioned, such as small pox or scarlet fever, can the infection be carried any considerable distance.

Every child who is suspected of having an infectious disease should be sent home immediately and in most cases, when the diagnosis is established, should be put under quarantine. Those who have been nearest to him, or who have been immediately associated with him, should also be excluded and kept under observation until the period of incubation or the time necessary to develop the disease, has past.

Under no circumstances should a member of the same family be admitted to the school. In all cases the room in which the disease has been found should be closed sufficiently long for its complete fumigation. Desks, floors and walls should be disinfected, and books, pencils and other simple paraphernalia used by the pupil should be burned. The infected child should not resume attendance after its recovery until a certificate from the attending physician is produced, stating that the danger from infection is passed.

A noticeable characteristic in these epidemic diseases is that one attack prevents a recurrence of the disease in the same individual. In this respect nature is kind, and provides in the blood a principle which confers immunity throughout life. Diphtheria presents an example of the principal exception to this rule.

Epidemic diseases are always characterized by fever more or less pronounced, due to tissue change and general disturbance of bodily function. These elevations of temperature

are spoken of as essential fevers, a term distinguishing them from the general rise of temperature to be found in chronic disease or following wounds or injuries. This type of temperature rise is known as symptomatic fever. An elevation of temperature in a puny child, who is known to suffer from some of the chronic ailments of childhood may not be viewed with alarm as far as school welfare is concerned; however, in one of robust temperament a manifestation of fever should at once awaken solicitude, and in all cases it is expedient that the cause be investigated at once.

The essential fevers owe their origin to a specific organism or germ. These germs are derived from cases of a similar nature and find access to the body by being inhaled into the lungs, or they may enter the mouth through the mediums of drinking cups, the fingers, kissing, etc. They may also be carried into the alimentary tract by food and drink. Finding in the body suitable nutriment for their existence they multiply enormously, and

a process of invasion begins with the general disturbances in each disease. Of these disturbances the first to be noticed is fever, and as this often presents itself before the child can transmit the disease to others, it should be watched for closely in the school room.

Many teachers who have the welfare of their pupils at heart, now have clinical thermometers. It would be well if all schools were provided with them. The object of the clinical thermometer is to estimate internal heat, and it should be placed when used so that the tissues completely surround the bulb. In the school room the positions most available are the mouth, and arm pit. If the arm pit is selected it should first be dried, otherwise a correct register will not be obtained. The bulb should be placed deep in the hollow of the arm and the arm pressed closely upon it. In all but nervous or refractory children the mouth is the most suitable location. The instrument must be placed well under the tongue and the lips should be held firmly to-

gether while the child breathes through the nose.

The human body has a temperature which varies only slightly in health and is not affected by either season or climate. This is spoken of as the normal temperature and is about $98\frac{1}{2}^{\circ}$ Fahrenheit. Very active exercise will elevate it a fraction of a degree, after which from exhaustion it may fall slightly below normal. In very young children, and after a full meal, it is often found to be slightly above what is known as normal, but this does not indicate an unhealthy disturbance.

Associated with temperature elevations marking the onset of contagious diseases are certain manifestations which are more or less constant. Among these headache is the most predominant. This is nearly always one of the earliest symptoms of epidemic fevers. It is usually the most pronounced at the beginning of the attack and abates or entirely disappears after the first few days of the disease.

The patients in the early stages of an acute

infectious disease may also be affected with vertigo or dizziness. They are likely to complain also of pains in the back or limbs, or a general soreness of the body or extremities. Not infrequently they complain of chilliness of the body and they may suddenly develop the most violent rigors. These are accompanied by a coldness of the surface of the skin and a rise of the internal temperature. The lips and finger tips may take on a bluish color, the face become pale, and the teeth chatter violently and a general aspect of distress is manifested. There may also be impairment of the mental faculties, ranging all the way from a dull stupor, to the wild delirium which immediately sets the school room into a frenzy of excitement.

The eyes often have a bright watery appearance with reddened lid margins. Deafness, especially at the advent of scarlet fever, is a common symptom and may be accompanied by great pain in the ear. Nose bleed occurs most frequently at the beginning of typhoid

fever. Vomiting is not an infrequent symptom. The breathing of the child is apt to be hurried, though it may be irregular or jerky. Cough is often present at the beginning of measles and typhoid. The skin, after the chill passes, is bright or flushed. This scarlet color disappears under pressure of the fingers and leaves a white spot which fades away slowly.

Eruptions of the skin are common in epidemic diseases. The character of these eruptions varies greatly and it is not to be supposed that they can be differentiated by the teacher. These suggestions are made, not with the view of having the teacher assume the mission of the physician, but to emphasize the importance of careful observation in the school room. Upon the acuteness of this observation will the welfare of many children depend. Should this be accomplished, the purpose of the chapter will have been fully achieved.

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